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Geology of the

Yanks Peak-Roundtop Mountain Area, Cariboo District, British Columbia

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Geology of the Yanks Peak-Roundtop Mountain Area, Cariboo District, British Columbia

SUMMARY

1. The Yanks Peak-Roundtop Mountain area lies at the head of several well-known placer creeks and contains numerous gold-bearing quartz veins.

2. The recorded gold production of the immediately surrounding district is 69,237 ounces of crude placer gold and 5,204 fine ounces of lode gold.

3. The area is underlain by a succession of schistose sedimentary rocks of late Precambrian and (or) Cambrian age known as the Cariboo group.

4. Formerly the Cariboo group was subdivided into the Richfield, Barkerville, and Pleasant Valley formations. These formational names have been abandoned, and the rocks of the Cariboo group now are divided into the Cunningham limestone, Yankee Belle, Yanks Peak quartzite, Midas, and Snowshoe formations.

5. The few intrusive rocks are dykes of diabase, diorite, rhyolite porphyry, and lamprophyre.

6. The rocks of the area are involved in a major syncline flanked by two overturned anticlines and in detail are intricately folded. The original structural interpretatio of Bowman and Uglow of a broad, simple anticlinorium involving huge thicknesses of rock must be abandoned.

7. The rocks are cut by northerly and northeasterly striking normal faults. Some faults have a lateral displacement of 800 feet, and in most instances the eastern block has dropped downward.

8. The area contains several centres of gold mineralization.

9. The localization of veins is dominantly the result of structural rather than stratigraphic factors.

10. The numerous quartz veins are grouped according to their strike into:—

   (*a*) Northerly striking veins occupying faults or shears.

   (*b*) Northeasterly striking veins occupying tension fractures that may have formed originally as extension joints but which were reopened subsequently by tensional forces resulting from movement along the northerly faults.

   (*c*) Easterly striking veins occupying shear fractures related to the northerly striking faults.

11. Most quartz veins are associated in one way or another with northerly striking faults; either they occupy the fault, or they occupy northeasterly or easterly striking fractures that are related to it. The three vein directions represent fracture directions that are genetically related, being two complementary directions of shear and the associated direction of tension.

12. The quartz mineralization of the three vein directions was essentially contemporaneous.

13. Ankerite is a common gangue mineral of the quartz veins. Sulphide mineralization is generally sparse and consists of pyrite, galena, and sphalerite. Scheelite, arsenopyrite, and tetrahedrite have been found.

14. Gold is associated with pyrite, and in outcrops becomes visible when the pyrite has been leached.

15. The gold mineralization is considered to be post-Jurassic in age.

16. The most productive placers were on Keithley, Little Snowshoe, Cunningham, and Harvey Creeks just beyond the limits of the area.

17. The erosion of veins within the area is thought to have contributed placer gold to local accumulations, but the chief placer stretches derived their gold from bedrock sources outside the area and closer to the placers.

18. In recent years several new mineral discoveries have been made, but future lode prospecting must be largely devoted to the finding of veins that are covered with overburden. The association of gold-bearing veins with northerly striking faults should provide a basis for close prospecting.

19. It is unlikely that placer prospecting will result in the finding of placer deposits better than small unworked remnants suitable for individual sniping or small-scale operation.

CHAPTER I.—INTRODUCTION

Work was started in an area around Yanks Peak as part of a programme of detailed investigations of the occurrences of lode and placer gold in the Cariboo. That particular area was selected for study because of the presence of gold-bearing quartz veins at the head of Little Snowshoe Creek; because of the area's position between the heads of Little Snowshoe and French Snowshoe Creeks, both of which are tributaries of Keithley Creek, from which placer gold worth at least $976,094 has been mined;[*] and because outcrops are more numerous there than in the lower, more heavily timbered and drift-covered Barkerville area.

The initial work around Yanks Peak resulted in an entirely new interpretation of the geological structure and a successful unravelling of the stratigraphy, and led to the extension of detailed mapping to the northeast to include the area around the Cariboo Hudson mine and Roundtop Mountain.

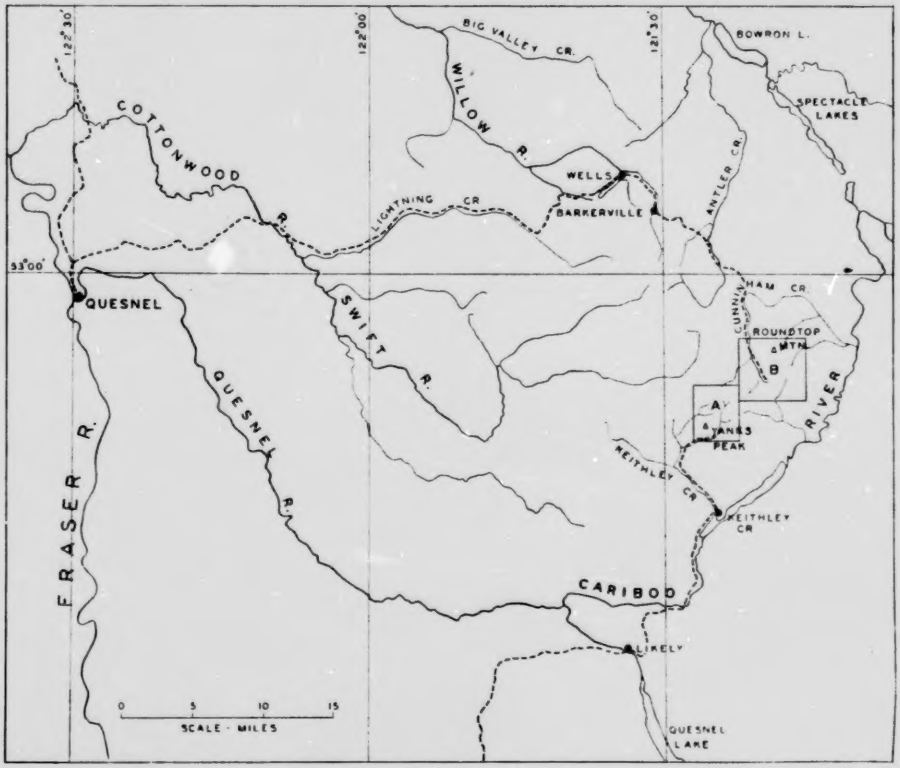
122°30'
122°00'
121°30'
BIG VALLEY CR.
BOWRON L.
SPECTACLE LAKES
WILLOW R.
COTTONWOOD R.
WELLS
LIGHTNING CR
BARKERVILLE
ANTLER CR.
53°00'
QUESNEL
SWIFT R.
CUNNINGHAM CR.
ROUNDTOP MTN.
B
A
YANKS PEAK
RIVER
KEITHLEY CR
KEITHLEY CR
QUESNEL R.
FRASER R.
CARIBOO
LIKELY
QUESNEL LAKE
0 5 10 15
SCALE - MILES

Figure 1. Index map showing location of Sheets A and B of Figure 2.

LOCATION AND ACCESS

The Yanks Peak-Roundtop Mountain area (*see* Fig. 1) comprises two adjoining rectangular map-sheets (Sheets A and B of Figure 2). Sheet A, the Yanks Peak sheet, is about 3½ by 4 miles in extent, with Yanks Peak, latitude 52° 48′ north and longitude 121° 29′ west, in its southwest corner; Sheet B, the Roundtop Mountain sheet, is about

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[*] This is the amount of gold mined from Keithley Creek and its tributaries since 1874 of which there is an official record. It was estimated by Robert Borland, who arrived at Keithley Creek in 1862, that the total production of Keithley Creek from 1860 to 1922 was about $5,000,000 (*see* Mining and Engineering Record, Vol. XXVIII, No. 1, p. 44).

4½ by 5 miles in extent, with Roundtop Mountain, latitude 52° 53′ north and longitude 121° 22′ west, on its north border. The two sheets adjoin, and their common boundary is just east of Base Mountain. Together they cover an area of about 36 square miles, extending across the strike of the formations for about 11 miles in a northeasterly direction.

Sheet A of Figure 2, the Yanks Peak sheet, covers most of French Snowshoe Creek and includes Luce Creek, the head of Little Snowshoe Creek, Aster Creek, and tributaries of the head of Cunningham Creek. Sheet B of Figure 2, the Roundtop Mountain sheet, includes the head of Cunningham Creek with its tributaries Peter Gulch, Pearce Gulch, Crazy Creek, and Copper Creek, the head of Simlock Creek, and the heads of Lostway, Nolaka, and Sixbee Creeks.

The area is easily accessible either from Keithley Creek bridge, which is 74 miles by road from Williams Lake, or from Barkerville, which is 60 miles from Quesnel.

From Keithley Creek bridge a road follows the east side of Keithley Creek, then crosses to the north side of French Snowshoe Creek, which it follows upstream to a camp built at Snarlberg by Amparo Mining Co. Ltd. in 1939, a total distance of 11 miles from Keithley Creek bridge. From the old camp a road passable for trucks or jeeps leads uphill to the ridge between Luce Creek and the head of French Snowshoe Creek and thence either to the Midas camp or to the Snowshoe camp. The old trail and wagon-road leads around the southeast and south slopes of Yanks Peak from the Midas camp to the Yankee Belle camp and continues on down the west side of the mountain to join the original Keithley Creek road just above the junction of French Snowshoe Creek. Another very old trail leads from the Hebson cabin near the Hebson vein to the Haywood cabin below the forks on Little Snowshoe Creek.

From Barkerville a good road extends 18 miles southeastward to the Cariboo Hudson mine. The road continues a mile farther to the head of Peter Gulch, thence a tractor-road crosses the summit and extends through open timberline country a distance of 5 to 6 miles to the Midas and Snowshoe camps at the head of Luce Creek.

A pack-horse trail from the Cariboo Hudson mine crosses at the very head of Simlock Creek and follows down the ridge to the east of Simlock Creek.

The open, park-like country at and above timberline is gently sloping and provides easy travel on the Snowshoe Plateau.

PREVIOUS WORK

The report on the first geological work in the Cariboo by Amos Bowman was published by the Geological Survey of Canada in the Annual Report for 1887–88, Vol. III, Part I. Bedrock geology is shown on the map accompanying this report on a scale of 1 inch to 2 miles. Details of the quartz veins and placer mines on Little Snowshoe and Keithley Creeks* are shown on a scale of about 1 inch to 2,100 feet, and on Cunningham Creek† on a scale of about 1 inch to 1,800 feet. Bowman mapped a major anticlinorium lying to the east of Yanks Peak and extending far to the northwest, and indicated by his structure section that the axial planes of the individual folds were inclined. Subsequent maps by several members of the Geological Survey of Canada show the axis of the original anticlinorium in much the same position as it was first mapped. This structural concept, originating with Bowman, exercised a strong influence upon subsequent geological mapping and beliefs.

Uglow mapped the Barkerville area in 1922,‡ and in 1933 and 1934 Hanson§ worked in greater detail along the Barkerville Gold Belt a few miles to the northwest of the present area. Lang worked between Yanks Peak and Roundtop Mountain while mapping the Keithley Creek map-area in 1935 and 1936. The reports by Lang,[*] and the Keithley Creek map[†] published on a scale of 1 inch to 1 mile, contain much material descriptive of the area and of the mineral showings. Additional descriptions of lode and of placer deposits are contained in various Annual Reports of the Minister of Mines, British Columbia, from 1874 to 1952.

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* *Geol. Surv., Canada,* Map 369, 1895.

† *Geol. Surv., Canada,* Map 368, 1895.

‡ *Geol. Surv., Canada,* Memoir 149, 1926.

§ *Geol. Surv., Canada,* Memoir 181, 1935.

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PRESENT WORK

This report is based on the following field work: a ten-day preliminary examination of the area in August, 1947; six weeks in August and early September, 1948; twelve weeks from June to September, 1949; ten weeks from July to September, 1950; and nine weeks in July and August, 1951. The writer was assisted in 1947 by W. H. Poole, in 1948 by D. Aitkens and W. D. McCartney, in 1949 by W. D. McCartney and C. A. McGregor, in 1950 by W. Holyk and C. A. McGregor, and in 1951 by A. Sutherland Brown and G. E. Apps.

No maps were available for plotting on the field scale of 1 inch to 400 feet, and consequently a base map was prepared by using as main control points the geographical positions of the triangulation-survey stations named Yanks, Aster A, Aster B, Harvey A, Harvey B, French Snowshoe, Roundtop, Middle, Bee, and Cunningham S. The positions of these and of the corner posts of the surveyed mineral claims were plotted from their co-ordinate locations to ensure over-all accuracy. All these points are marked and can be found on the ground. Details of roads, trails, creeks, etc., were added from chain and compass, and plane-table traverses, tied wherever possible to surveyed claim posts or fixed geographical points.

Contour lines on the base map were derived largely from form lines transferred from vertical aerial photographs and controlled by ground elevations obtained from altimeter readings corrected with reference to one or more of the geographic points, and from plane-table field sheets.

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[*] *Geol. Surv., Canada,* Papers 36-15 and 38-16.

[†] *Geol. Surv., Canada,* Map No. 562A.

Geological observations were located by closed chain and compass traverses, or by plane-table surveys tied in at frequent intervals to known locations. These traverses were plotted on the base map on a scale of 1 inch to 400 feet. A small area of extreme structural complexity, on the southeast slope of Yanks Peak, was mapped by plane-table and stadia on a scale of 1 inch to 100 feet, and an area northeast of Yanks Peak explored by bulldozed trenches was mapped by tape and compass on a scale of 1 inch to 100 feet.

To provide the framework of geological information, all roads, trails, claim lines, creeks, and ridges were traversed. Additional traverses were made along formational contacts or for special purposes. Because of the extraordinarily good weather during the summers of 1950 and 1951 most of the country around Roundtop Mountain was mapped by plane-table, whereas inferior weather in 1948 and 1949 necessitated mapping the Yanks Peak area almost entirely by chain and compass traverses.

Detailed mapping of the workings on the outcrops of the Snowshoe, Jim, Midas, Yankee Belle, Cornish Ledges, and other veins was all done by plane-table and stadia on a uniform scale of 1 inch to 40 feet.

Transit surveys of the three adits of the Snowshoe mine and of the underground workings of the Cariboo Hudson mine were available. Underground geology was plotted on these on a scale of 1 inch to 20 feet. Chain and compass surveys were made of the Midas adit and Jim adit and plotted on a scale of 1 inch to 20 feet to provide a base for mapping the underground geology.

The magnetic declination was taken to be 26 degrees east of north.

PHYSICAL CHARACTER OF THE AREA

The Yanks Peak-Roundtop Mountain area lies near the western side of a transition zone between the high, extremely rugged Cariboo Mountains on the east and the lower, wooded, concordant summit areas of the Fraser Plateau on the west (*see* Plates I (A) and I (B) showing views looking east and west). The area is at the divide between creeks flowing into Keithley Creek, Harvey Creek, Antler Creek, and Cunningham Creek. It includes part or most of French Snowshoe, Little Snowshoe and its tributary Luce Creek, Peter Gulch, Pearce Gulch, Copper, Crazy, Simlock, Lostway, Nolaka, and Sixbee Creeks.

The several high points in the area are Roundtop Mountain, Middle, Base Mountain at triangulation station Harvey A, and Yanks Peak. The extreme differences in elevation are between Yanks Peak at 6,242 feet elevation and French Snowshoe Creek at about 4,000 feet elevation, and between Roundtop Mountain at 6,763 feet elevation and Cunningham Creek at 4,200 feet elevation. Most of the area lies above the 5,000-foot contour.

Yanks Peak, though not the highest point, stands out prominently mainly because it dominates its immediate surroundings (*see* Plate II (A)). It slopes steeply southward into French Snowshoe Creek, and drops off abruptly northward into Luce Creek. Jews Hollow and the next basin to the west evidently were occupied by cirque glaciers whose steepened headwalls account for the abrupt north face of the peak.

Roundtop Mountain displays its characteristic mesa-like top when viewed from the south (*see* Plate III (A)). From other directions the peak appears only as the culmination of a long, gradually sloping ridge.

Flat-topped ridges and gentle open slopes above 5,500 feet elevation connect the high points and slope downward into the several valleys. The upland area between Cunningham Creek and Yanks Peak is locally called the Snowshoe Plateau (*see* Plate III). This upland surface extends northeastward past the Cariboo Hudson mine to the long ridge running southeastward from Roundtop Mountain.

Despite their having been glaciated, the valleys of French Snowshoe, Little Snowshoe, Cunningham, and Simlock Creeks have narrow bottoms and moderately to steeply flaring sides (*see* Plate I (A)). The valley slopes, up to about 5,500 feet elevation, are fairly heavily timbered. On them outcrops are few and are scattered at random. Above 5,500 feet elevation the timber is patchy and open areas increase in size as timberline is approached. The divide areas between the heads of Little Snowshoe and Aster Creeks, between French Snowshoe and Cunningham Creeks, and between Copper and Lostway and Nolaka Creeks are open expanses of alpine meadow.

Rock outcrops on the upland areas are not particularly abundant except along ridges underlain by hard, more resistant beds, nor are they particularly abundant along the valley bottoms. For mapping on a 400-foot scale the outcrops in many parts are not adequate, and most dependence, therefore, has been placed on areas of outcrop found above 5,500 feet elevation.

The resistance to erosion of different rocks is reflected in varying degrees by the topography. The extremely hard, massive, and silicified Yanks Peak quartzite forms prominent outcrops, and its position accounts for the height and location of Yanks Peak as well as of Roundtop Mountain and the other high points along strike to the southeast. Massive quartzite of the Snowshoe formation forms widespread outcrops on Base Mountain and to the northeast, on the ridge north of Aster B, and east of the head of Little Snowshoe Creek; whereas softer, fissile rocks such as sericite schist, argillaceous schist, and quartz sericite schist outcrop poorly and for the most part occupy depressions between ribs of harder quartzite.

The area was covered by glacial ice to the summits of the highest peaks. The effects of glacial erosion are to be seen in the cirque basins on the north side of Yanks Peak and on the northwest side of Roundtop Mountain, and in the steepened sides and heads of Lostway and Nolaka Creeks and of Aster Creek and Holmes Basin. Breakneck Ridge, lying between the last two, is well named. The valleys of all creeks were glaciated but to varying degrees. At several places on Cunningham Creek and near the heads of Little Snowshoe and French Snowshoe Creeks boulder clay lies directly on smooth, glaciated bedrock. In the lower stretches of Little Snowshoe Creek ice did not scour the bottom of the valley. There, gravel lies beneath boulder clay, and pre-glacial placer deposits were not dispersed. The results of glaciation are to be seen in the widespread mantle of boulder clay and glacial drift which covers bedrock in the valley bottoms and on the lower valley slopes and which effectively hides bedrock over much of the area. That glacial ice at one stage moved in a southerly or southwesterly direction is indicated by the presence of a glacial erratic of rhyolite porphyry on the ridge northwest of Yanks Peak. The only known outcrops of such rock are at the head of Luce Creek and on Horseshoe Nail Gulch to the northeast and north.

CHAPTER II.—GENERAL GEOLOGY

INTRODUCTION

The gold-mining region of the Cariboo lies within an area 18 miles wide by at least 40 miles long, extending from Cariboo River on the southeast to Willow River and Big Valley Creek on the northwest. All this area is underlain by the Cariboo group of schistose sedimentary rocks. Intrusive rocks are rare and comprise a few dykes of rhyolite porphyry, lamprophyre, diabase, and diorite.

On the northeast, in a large synclinal area, the Cariboo group is unconformably overlain by the Slide Mountain group of Mississippian age and on the southwest is unconformably overlain by the Quesnel River group of Jurassic age. To the southeast, on Kimball Creek, rocks that have been correlated by Lang with the Cariboo group are stated by him[*] to be overlain, apparently conformably, by Lower Cambrian beds. Furthermore, Cambrian fossils have been found by A. Sutherland Brown in limestone beds on Turks Nose Mountain. At this stage it is uncertain whether the Cariboo group is late Precambrian, or wholly or in part Cambrian in age.

In the Barkerville area the Cariboo group was divided by Uglow[†] from oldest to youngest into a dominantly quartzitic succession, the Richfield formation; a dominantly limestone succession, the Barkerville formation; and a dominantly argillaceous succession, the Pleasant Valley formation. This threefold subdivision was used by Lang when the geological mapping was extended into the Cariboo Mountain, Keithley Creek, and Little River areas (*see Geol. Surv., Canada,* Maps 561A, 562A, and 563A).

The Yanks Peak-Roundtop Mountain area is entirely underlain by rocks of the Cariboo group, but the former threefold subdivision was found to be an unsatisfactory basis for mapping. Field work in the vicinity of Roundtop Mountain unquestionably demonstrates that the limestone mapped there by Uglow[‡] and Lang[§] as Barkerville formation underlies rather than overlies the Richfield formation, and that the rocks mapped there as Pleasant Valley formation rather than being a conformable succession of uniformly facing beds are actually argillaceous rocks and other members of the Richfield formation, repeated by complex folding on the northeast side of a major anticline. Moreover, between Yanks Peak and Base Mountain the rocks were mapped by Lang[‖] as undivided Richfield formation lying conformably beneath his subdivisions of the upper Richfield. The present structural interpretations are incompatible with Lang's concept and indicate that the Hudson, Bee, Roundtop, and Lostway members have no stratigraphic entity, and that these members which he described and mapped near the Cariboo Hudson mine are actually repetitions by folding of rocks that outcrop near Yanks Peak.

It became apparent during the course of the work that the stratigraphy and mapping of the Cariboo group should be completely revised. As a consequence, the former threefold subdivision of the Cariboo group was abandoned and a fivefold division substituted. The detailed mapping has been extended between Roundtop Mountain and Island Mountain by A. Sutherland Brown, and the results of his work, to be published in a forthcoming bulletin of the Department of Mines, will supplement this report.

Within the present area the structure is so intricate that a detailed knowledge of the stratigraphy was acquired only as the complexities of both the regional and detailed fold structures became apparent. The age succession was not established on the basis of primary sedimentary structures. The complex, isoclinal folding makes it incorrect to assume that a bed faces in the same direction that it dips, and consequently the succession was worked out almost entirely by interpretation of minor secondary structures such as dragfolds and cleavage-bedding relationships (*see* Plates V (A) and V (B)), tested against the simultaneous interpretations of the larger fold structures. Graded bedding and cross-bedding (*see* Plate IV (A)) are not widespread and where observed only served to confirm the age relationships determined structurally.

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[*] *Geol. Surv., Canada,* Paper 38–16, p. 13.

[†] *Geol. Surv., Canada,* Mem. 149, p. 12.

[‡] *Geol. Surv., Canada,* Mem. 149, p. 11 and Map 2046.

[§] *Geol. Surv., Canada,* Paper 38–16, p. 10 and Map 562A.

[‖] *Geol. Surv., Canada,* Map 562A, Keithley Creek.

In the Yanks Peak-Roundtop Mountain area the Cariboo group is divided into five major map units. These are, from oldest to youngest, the Cunningham limestone, light grey to cream thick-bedded limestone; the Yankee Belle formation, comprising olive and grey argillaceous slates, silty quartzites, and chlorite schists; the Yanks Peak quartzite, a prominent bone-white or pale-grey dense massive quartzite; the Midas formation, comprising grey and black siltstones, slates, and schists, and some black limestone, and characterized by the presence of black silty quartzite;* and the Snowshoe formation, comprising a basal pebble conglomerate, grey gritty quartzite, quartz sericite schist, chlorite schist, and light-grey limestone. The base of the Cunningham limestone is not exposed in the area, nor is the top of the Snowshoe formation.

One of the most noticeable effects of the complex structure is a tremendous apparent thickening of stratigraphic units by repetitive isoclinal folding. For example, the Midas upper black silty quartzite, which is about 25 feet thick, is folded into accordion-like pleats about essentally horizontal axes and nearly vertical axial planes so that it outcrops along the ridge north of the Snowshoe mine camp across a width of about 900 feet. On Base Mountain, northeast of Harvey A, a band of coarse grey grit is repeated at least six times in a distance of about 2,500 feet across the strike. On the east rim of Jews Hollow a band of Midas black silty quartzite is repeated seven times in a distance of about 1,000 feet between the Yanks Peak quartzite and the Saddle shaft. In that distance there are three minor but distinct anticlinal axes. On Horseshoe Nail Gulch the basal Snowshoe conglomerate is repeated in long narrow outcrops that are the keels of three synclines. The members of all units are thickened to an almost unbelievable extent, and consequently an estimate of the true thickness of any unit can be made only after most of the structural details are known. Previous estimates must have been quite empirical† because the structure was not understood.

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* This rock properly should be named a metasiltstone but herein is called a silty quartzite. The quartz grains are of silt size.

† *Geol. Surv., Canada, Ann. Rept.* 1887-88, Vol. III, Pt. I, Pt. C, 1889, p. 24c; Mem. 149, pp. 33, 34; Paper 38-16, p. 10.

TABLE OF FORMATIONS

Age	Formation			Lithology	Estimated Thickness in Feet
	Intrusive rocks.			Dykes of rhyolite porphyry, lamprophyre, diabase, and diorite.	
				Intrusive Contact	
Late Precambrian and (or) Cambrian.	Cariboo group.	Snowshoe formation.	Upper member.	Dark grey limestone, chlorite schist, black slate.	100
			Middle member.	Fissile, grey argillaceous quartzite; fissile, pinkish-brown weathering, sericitic quartzite.	200
			Lower member.	White to grey hard grit and quartzite, some feldspathic; interbeds of finer-grained argillaceous quartzite.	200
			Basal member.	Pea pebble conglomerate, pancake conglomerate, or limestone conglomerate; grey gritty quartzite with argillaceous partings or thin argillaceous interbeds.	20
		Midas formation.		Grey to black silty quartzite, argillaceous schist and slate with porphyroblastic ankerite, black fine-grained quartzite, grey sericitic argillaceous schist, ankeritic quartzite, and black limestone.	500
		Yanks Peak quartzite.		Grey to white, dense, fine-grained silicified quartzite, in places gritty or almost a pea-pebble conglomerate.	50 to 200
		Yankee Belle formation.		Light-grey to brown phyllite with interbedded quartzite, chlorite schist, characterized by absence of black silty quartzite and at Yanks Peak by presence of numerous smoky-grey quartz veinlets.	500 to 900
		Cunningham limestone.		Fine-grained, grey to black limestone largely bleached light grey to cream with thin chloritic interbeds in the upper 50 feet.	At least 400

SEDIMENTARY ROCKS

CUNNINGHAM LIMESTONE

The Cunningham limestone is the oldest formation in the area. Its base is not exposed and its top is the last limestone bed below a succession of chlorite schists which conformably overlies it.

Cunningham limestone is exposed in a single continuous northwesterly striking belt about 7,000 feet wide, lying on the northeast side of Roundtop Mountain and Middle and extending beyond the limits of the area.

The formation is almost entirely limestone, which is fine-grained and is light-grey to cream coloured on weathered surfaces. The upper 50 feet or so consists of thinly bedded calcareous and chloritic layers (*see* Plate VII (B)). The chloritic beds weather more readily, leaving inch-thick ribbons of limestone in relief. Most of the underlying beds are thick-bedded and may contain chert in nodules and hard irregular masses.

The original limestone appears to have been dark grey to black and to have been bleached to very pale grey in areas that are definitely related to fractures and quartz veins. The bleaching was followed by the addition of iron which combined to form carbonates which on weathering impart a pale-cream to light-buff or brown colour to the rock. There has been some recrystallization and coarsening of the grain texture.

The full thickness of the formation is not known since its base is not exposed within the area. The greatest thickness observed is about 400 feet.

The top thinly bedded 50 feet of the formation is rather intensely folded into minor dragfolds, but below this zone the outlines of the folds are smoother and the folds themselves are larger than in the overlying formations. The shapes of the folds in the Cunningham limestone differ from those in the younger formations. It is possible that this limestone, at least as far southwest as Yanks Peak, may have formed a basement to the intense folding of the overlying rocks, because no Cunningham limestone is seen in the cores of the anticlines at Bee and Yanks Peak.

On Geological Survey Map 562A the Cunningham limestone is mapped as Barkerville formation and is shown as conformably overlying the rocks that are on the southwest side of it. In actuality, the formation is fairly thin and is involved in a major complex anticline which spreads the outcrops across a width of 7,000 feet or more. The name Barkerville formation has been abandoned because the unit as originally described by Uglow no longer exists. Moreover, it is believed that on Uglow's map of the Barkerville area (*Geol. Surv., Canada,* Map 2046) limestones from several stratigraphic horizons were correlated and mapped as Barkerville formation.

YANKEE BELLE FORMATION

The Yankee Belle formation conformably overlies the Cunningham limestone and in turn is overlain by the Yanks Peak quartzite.

It outcrops in four separate areas: in the core of an anticline in an area on the south and west slopes of Yanks Peak and in the canyon of French Snowshoe Creek; in the core of an anticline in an area extending northwest from Bee; and in two strips flanking the anticlinal outcrop of Cunningham limestone and lying northeast of Roundtop Mountain and Middle and southwest of Cunningham S. Its stratigraphic position below the Yanks Peak quartzite was first deduced from its structural position in the core of the Yankee Belle anticline. Correlation of the isolated outcrop areas is based on analysis of the structure and knowledge of the lithologic sequence.

The top of the formation lies at the base of the first hard white massive quartzite of the overlying Yanks Peak quartzite, and its base includes the lowest chlorite schist that overlies Cunningham limestone.

Near Yanks Peak the Yankee Belle formation consists dominantly of grey silty quartzites, grey argillaceous and sericitic schists, and lesser amounts of grey quartzite. On the trail from the Midas claims to the Yankee Belle camp a characteristic rock is a light-grey brownish-weathering quartzite, thinly laminated with grey silty quartzite and argillaceous schist. An almost complete section is exposed in the canyon on French Snowshoe Creek downstream from where the Yanks Peak quartzite crosses the creek at J. Sockett's mineral showing. The rocks are fairly uniform and are predominantly dark-grey fine silty quartzite, and argillaceous schist and slate. They have light-coloured laminations as much as an eighth of an inch thick which may be either ankerite or quartz-ankerite veinlets lying parallel to the schistosity. In the upper part of the canyon and near the Yankee Belle adit the rocks contain scattered pyrite cubes as much as half an inch across. As a general rule, the rocks weather to a light brown except on the main road below Snarlberg, where outcrops of grey slates and grey slaty argillaceous rocks are not unlike some members of the Midas formation. On the slopes of Yanks Peak above the Yankee Belle camp, the Yankee Belle rocks contain numerous smoky-grey quartz veins and lenticles, of which some crosscut the foliation and some are parallel to it. This smoky vein quartz is exceedingly common and appears to be restricted to the Yankee Belle formation and the overlying Yanks Peak quartzite.

Rocks of the Yankee Belle formation are not everywhere readily distinguishable from those of the Midas formation. The main lithologic characteristic is the presence of black silty quartzite in the Midas formation and its absence from the Yankee Belle.

In the vicinity of Roundtop Mountain the lowest part of the Yankee Belle formation is fine-grained thinly bedded chlorite schist. This rock grades upward into a lustrous light-grey to brown phyllite which weathers to a characteristic celadon (brownish grey-green) colour. The next sequence comprises phyllite with interbeds of fine-grained brown quartzite as much as 10 feet thick. The uppermost rocks are celadon and grey phyllites containing a few quartzite beds. Some of these upper quartzite beds are similar to Yanks Peak quartzite, and possibly the two formations interfinger.

Highly chloritic rocks of the Yankee Belle are seen in conformable contact with the Cunningham limestone and in the core of the Bee anticline, but not elsewhere. They are believed to reflect the composition of the original rocks rather than areas of higher metamorphic grade.

Near Yanks Peak grey silty quartzites are crossed by narrow white quartz veinlets from which an alteration spreads out into the wallrock. In some instances the entire rock-mass is altered to a drab olive-green colour.

Because of structural complexities and lack of outcrops the complete structure of the Yankee Belle succession was not worked out. As a consequence, a close estimate of the thickness is not possible. The total thickness cannot be more than 900 to 1,000 feet and in all probability is about 400 to 500 feet. On Lostway Creek chloritic schist about 150 feet thick is exposed in an uncomplicated dragfold. The uppermost grey phyllite is probably not more than 50 feet thick and the phyllite and quartzite succession may be only 200 to 300 feet in total thickness.

The exceedingly complex pattern of folding in the Yankee Belle beds undoubtedly results from the marked difference in competence between them and the underlying fairly thick Cunningham limestone and the overlying hard competent Yanks Peak quartzite. On the northwest side of Roundtop Mountain and elsewhere the amplitude of folds of quartzite beds in the Yankee Belle is seen to be very much greater than that of folds in the immediately overlying Yanks Peak quartzite. In several instances tight anticlines 15 or 20 feet across have isoclinal limbs 50 to 100 feet long. The development of exceedingly thin papery phyllite near the apices of folds in the Yankee Belle emphasizes the fact that large amounts of movement have taken place. In the Yankee Belle and Bee anticlines the tightly compressed cores of Yankee Belle formation have evidently pulled away from the Cunningham limestone which underlies them at unknown depth.

The Yankee Belle formation includes the "green schistose argillite" which Lang* placed in the Lostway member.

YANKS PEAK QUARTZITE

The Yanks Peak quartzite is an easily recognizable light-coloured quartzite which provides an extremely valuable horizon for outlining the complex folds. It lies conformably above the Yankee Belle formation and below the predominantly dark-coloured Midas formation. The rock is prominently exposed on the summit and flanks of Yanks Peak, where it is involved in exceedingly intricate folding. The outcrop of the bed has a horseshoe-like trace which outlines the northwesterly plunging Yankee Belle anticline. Similarly, it should outline the anticline at Bee, but so far as could be determined it does not outcrop there. The formation is widely distributed across a width of 2,000 to 3,000 feet in a belt extending northwest and southeast of Roundtop Mountain.

The Yanks Peak quartzite is an essentially uniform quartzite, medium to dark grey in colour but in most places light grey to bone white on weathered surfaces. The formation in places has thin interbeds of dark slaty material which increase in number toward the Yankee Belle and Midas contacts. At its base the quartzite in several places shows a noticeable coarsening to gritty material or to a pea-pebble conglomerate. The coarser material is cross-bedded with a small angle of truncation of the beds. It is possible that the cross-bedding is more widespread but is masked by the general silicification that the formation has undergone. In some places the rock appears almost like vein quartz. At Yanks Peak the formation is crossed by numerous smoky-grey quartz stringers like those in the underlying Yankee Belle formation.

The quartzite is extremely hard and massive and forms bold outcrops on Yanks Peak, Roundtop Mountain, Middle, and other prominent points whose height results from the rock's resistance to erosion.

Where the formation is involved in complex folding, its apparent thickness may be increased several fold, or may be greatly reduced. For long stretches the formation is absent and the Yankee Belle formation is in contact with the Midas. On Yanks Peak the formation outcrops in areas that are arranged like a string of irregularly sized beads or like links of sausage. At least in part the formation has been stretched, thinned, and completely torn apart, and illustrates boudinage on a huge scale. In other places it is believed that the absence of the formation and differences in thickness are depositional features.

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* *Geol. Surv., Canada, Paper 38-16, p. 8.*

The Yanks Peak quartzite ranges in thickness from a few feet to about 200 feet. Near Yanks Peak the formation is 50 to 100 feet thick. At the Simlock fault it is about 200 feet thick, at the crests of Roundtop Mountain and Middle it is 125 to 150 feet, but on the limbs of folds it is about 50 feet, on the northeast limb of the easternmost syncline on Roundtop Mountain, Middle, and on the ridge between Nolaka and Sixbee Creeks it is from 2 to 10 feet thick.

The Yanks Peak quartzite was found to be an extremely valuable marker; its outcrop was traversed throughout most of its length and it was mapped in greater detail than were the other formations. In this way the Yankee Belle anticline was resolved and the stratigraphic succession of the Yankee Belle, Yanks Peak, and Midas formations established. The stratigraphic position of the Cunningham limestone was confirmed through knowledge of the fold structure outlined by the Yanks Peak quartzite.

Because of its competence the formation was a modifying factor in the type of regional folding. It was dragfolded, in many instances very tightly (*see* Plate VIII), but in general more gently than either the underlying Yankee Belle or overlying Midas formations. The general form of the folds outlined by Yanks Peak quartzite could be determined in most instances from the trace of the formation, and although the major folds persist along strike, with some modification of shape, innumerable minor folds die out and are replaced by others. Commonly the formation is torn apart at inflexion points, allowing greater flowage in the surrounding rocks. As a consequence of the flowage, small structures are formed near by that are far more complex than those in the Yanks Peak quartzite.

An important element of the regional structure is the correlation of the two unconnected areas of exposure of Yanks Peak quartzite on Yanks Peak and between Roundtop Mountain and Sixbee Creek. The correlation is based on lithology and on study of the stratigraphic sequence in conjunction with major fold structure.

The Yanks Peak quartzite was mapped by Lang* as part of the Roundtop member.

MIDAS FORMATION

The Midas formation is essentially an assemblage of grey and black, dominantly argillaceous rocks lying conformably above the distinctive Yanks Peak quartzite and in turn overlain by basal conglomerate or grit of the Snowshoe formation.

The Midas formation envelops the horseshoe-shaped trace of the Yankee Belle anticline and outcrops in a number of narrow parallel ribbons to the southwest of Base Mountain. It occurs as a single band 7,000 feet wide southwest of Roundtop Mountain and Middle, and occupies synclinal troughs to the northeast.

Near Yanks Peak

In the vicinity of Yanks Peak, details of Midas stratigraphy are known largely through detailed mapping of the Midas bulldozed cuts (*see* Fig. 11 and p. 29). Although a considerable amount of time was devoted to this work, an entirely satisfactory solution was not possible. Because the folding is exceedingly complex and outcrops are few, several interpretations are possible. One is that two anticlines lie between the Saddle shaft and the Midas-Snowshoe contact. This interpretation requires that the outcrops of black fine-grained silty quartzite† probably represent the traces of three separate bands of rock.

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* *Geol. Surv., Canada,* Paper 38-16, p. 8.

† This rock could be called metasiltstone. The constituent quartz grains are of silt size.

The following stratigraphy is based on the assumption that three black silty quartzite bands are present.

STRATIGRAPHY OF THE MIDAS FORMATION NEAR YANKS PEAK

	Member	Lithology	Estimated Thickness in Feet
Midas formation.	Midas limestone.	Grey limestone.	0 to 10
	Ankerite rock.	Ankeritic quartzite.	10
	Upper black quartzite.	Black fine-grained silty quartzite.	25
		Mostly grey sericitic argillaceous schist and biscuit-weathering sericitic schist.	Less than 200
	Middle black quartzite.	Black fine-grained silty quartzite.	25
		Grey to black argillaceous schist and slate with porphyroblastic ankerite, some may be thinly laminated.	Less than 200
	Lower black quartzite.	Black fine-grained silty quartzite.	25
		Laminated grey to black argillaceous schist and slate.	75

Near Yanks Peak the characteristic members of the Midas formation consist of black exceedingly fine-grained silty quartzite which may have $\frac{1}{32}$- to $\frac{1}{16}$-inch white laminations. This rock is strikingly similar in appearance to the Basal member of the Richfield formation in the Wells-Barkerville area.

On the east rim of Jews Hollow a single band of black silty quartzite 10 to 25 feet thick lies about 75 feet from the contact of the Yanks Peak quartzite. The intervening rock is grey to black argillaceous schist with light-coloured quartzite laminations one-sixteenth to one-eighth of an inch thick. The rocks lying above this lower black silty quartzite member are dominantly dark grey to black argillaceous schists, some of which are thinly laminated and some are spotted with porphyroblastic ankerite.

The middle black silty quartzite member is about 25 feet thick, although it outcrops across considerably greater widths southeast of the Saddle shaft and southeast of the outcrop of the Lipsey vein. It is immediately overlain by a thin layer of pale biscuit-weathering sericite schist and by light- to medium-grey sericitic argillaceous schists. These rocks are well exposed on the trail and in the bulldozed cuts between the Lipsey vein and the Saddle shaft.

An upper black silty quartzite member about 25 feet thick overlies the sericitic schists. This upper black silty quartzite outcrops on the ridge north of Luce Creek and in the narrow ribbons of Midas rock to the northeast. It in turn is overlain by a peculiar ankeritic quartzite that is massive and extremely resistant to erosion. When fresh this ankeritic quartzite has a grey crystalline appearance, but in most outcrops it is weathered to a rich reddish brown which is most distinctive. In a few places the rock contains small flakes of a bright-green mica and may show layers and streaks of unreplaced quartzite or of limestone. It is widespread in its occurrence, outcropping at the head of the second switchback above Snarlberg, at the point selected by Amparo Mining Company Ltd. for the portal of a low-level crosscut, on the ridge north of Luce Creek, northeast of the Snowshoe camp, on Horseshoe Nail Gulch, and at many other places. This rock appears to occupy the same stratigraphic horizon near the top of the Midas formation.

The upper black silty quartzite in a few places is underlain by an ankeritic argillaceous schist which is fissile and contains layers of dark argillaceous material. This rock is unlike the ankeritic quartzite elsewhere.

The uppermost member of the Midas, not everywhere present, is a thin bed of grey limestone. It outcrops near the top of the eighth switchback above Snarlberg, at the top of the road leading down to the Midas Camp, on the ridge north of Luce Creek, and in the small creek flowing southward into the head of Little Snowshoe Creek. The limestone bed probably is not more than 10 feet thick. Its absence in many places may indicate either a lack of deposition or an erosional unconformity below the basal Snowshoe conglomerate.

Near Roundtop Mountain

The Midas formation near Roundtop Mountain differs in detail from the formation as mapped near Yanks Peak. In general, however, it is likewise an assemblage of dominantly black argillaceous and quartzitic rocks with a bed of black limestone at its very top. The correlation of the Midas formation near Roundtop Mountain and Middle with similar rocks to the southwest is based on the interpretation that the section southwest of the Yanks Peak quartzite on Roundtop Mountain and Middle is overturned.

The basal Midas is a grey, rusty-weathering phyllite which in turn is overlain by a rather characteristic light- to dark-grey finely banded siltstone or fine silty quartzite. Typically this rock is cross-bedded (*see* Plate IV (A)), the beds being truncated at an angle of about 30 degrees. Overlying it are black slates and black fine-grained argillaceous quartzites. At the top of the formation is a black limestone bed, possibly 25 feet thick, well exposed above the bridges on Copper Creek, northeast of the Bralco cabin, and in Simlock Creek. The limestone that outcrops widely in a belt northeast of the Bralco cabin is a single bed repeated many times by isoclinal folding.

On Bee, in the cirque at the head of Nolaka Creek, and at several other places are outcrops of reddish-brown weathering ankeritic quartzite similar to the rock above the upper Midas quartzite at Yanks Peak.

Although the upper Midas limestone was originally black, in most outcrops it is now light grey, mottled, or is slightly buff weathering. The black limestone has been bleached and altered along cracks and fractures so that all intermediate mottled stages exist between black and white. In some instances iron carbonate has been introduced and a pale-cream or buff colour is imparted to the limestone on weathering.

The Midas rocks have been ankeritized more than any others, and may contain numerous large ankerite porphyroblasts. Near the diorite dyke on Middle the ankeritization has been moderately intense.

The Midas formation is as intensely deformed as the Yankee Belle. It lies between the more competent Snowshoe formation and the underlying Yanks Peak quartzite, and has accommodated itself by folding and flowage to outlines imposed upon it by the stronger rocks. Even though the rocks are reasonably well exposed northeast of Yanks Peak, the internal structures are far too complex for precise delineation from information available. Near Middle the lower thinly bedded siltstone forms relatively large dragfolds which are enveloped by tight isoclinally folded slate and papery schists. The upper limestone, being easily recognized, is seen to be widely distributed and to be closely and repeatedly folded.

The top of the Midas formation may be either the upper black silty quartzite, ankerite rock, or limestone. In part this may be the result of beds having been squeezed out during intense folding or, alternatively, it may indicate a period of erosion before the deposition of the basal Snowshoe conglomerate.

The base of the formation is at the lowermost black slate or phyllite resting upon Yanks Peak quartzite. The true thickness of the formation cannot be closely determined. In the bulldozed cuts on the ridge northeast of Yanks Peak a thickness of about 500 feet is apparent, whereas along French Snowshoe Creek near the southwest corner of the area an interpretation of exposures there indicates that the total thickness of the formation may be only about 300 feet. Near Roundtop Mountain there are no complete and uncomplicated sections of the Midas. It is estimated, however, that the total thickness is 400 feet or slightly more.

The Midas formation includes " black to dark grey massive and fissile argillites " included by Lang* in the Lostway member, the " black, fissile argillite " of the Bee member, and also the limestone and argillite included by Lang in the upper Hudson member.

SNOWSHOE FORMATION

The Snowshoe is a dominantly quartzitic formation that includes the youngest sedimentary rocks in the area. Its base is a conglomerate or coarse grit lying above the upper Midas limestone and its top is not exposed. It is the youngest formation of the Cariboo group exposed in the area.

The Snowshoe formation outcrops in a single belt 16,000 feet wide between Base Mountain and the Bralco cabin and in several narrower bands, separated by Midas rocks, on the southwest side of Base Mountain. These belts all occupy synclinal structures.

A fourfold subdivision of the Snowshoe is recognized, but only the separation of the upper member is shown on Figure 2, Sheet B.

The basal Snowshoe member in most instances is a light- to medium-grey pea-pebble conglomerate (*see* Plate VI (A)). Occasional cobbles larger than walnut-size may be present. The conglomerate has been deformed and the pebbles now have the general proportions of a pumpkin seed, and may be as large as small pancakes. The pebbles are composed very largely of grey quartzite, and very few black Midas-type quartzite pebbles are to be seen. The composition of the conglomerate does not seem to bear any relationship to the rocks immediately underlying it. In some places the basal Snowshoe is a coarse grit or quartzite, and in Holmes Basin and on the face west of Harvey B is a limestone conglomerate. East of the head of Cunningham Creek, where much Midas limestone is present, the basal Snowshoe is a non-calcareous quartzite. The fact that the basal Snowshoe appears to overlie a variety of Midas rocks suggests that there may have been an erosion interval before its deposition. Nevertheless, there is no evidence of angular unconformity between the two formations.

The lower Snowshoe member is composed of grey, sometimes white, hard grit and quartzite, some of which is feldspathic. A common quartzite has quartz grains the size of rice. They are either smoky brown or an opalescent pale milky blue. The lower Snowshoe quartzite is extremely hard and outcrops in ridges on the Snowshoe Plateau. Interbeds of fine-grained argillaceous and silty quartzites are less prominently exposed.

The middle Snowshoe member comprises fissile, grey, argillaceous quartzites, and fissile sericitic quartzite that contains sufficient ankerite in disseminated grains and streaks for the rock to weather a pinkish or pale reddish brown. These rocks are well exposed between Harvey B and French Snowshoe, between Aster A and Aster B, and on two small creeks flowing east into the head of Cunningham Creek. Middle Snowshoe rocks almost invariably occupy the centres of minor synclines.

The upper Snowshoe member comprises limestone, chlorite schist, and some black slate, outcropping in a belt about 1,200 feet wide that extends northwestward from the Shasta No. 2 claim (Lot 9821), past the junction of Pearce Gulch and Peter Gulch, to the canyon on Cunningham Creek 1,500 feet above the junction with Peter Gulch. This belt extends northwestward to Antler Creek at the mouth of Nugget Gulch. The upper Snowshoe limestone in the canyon on Cunningham Creek is dark grey to black, but along bedding planes and fractures it is bleached white (*see* Plate V (B)) and is cut by ankeritic stringers which weather buff to red brown. In the vicinity of Yanks Peak the only known upper Snowshoe rocks outcrop in Holmes Basin.

The top of the Showshoe formation is not exposed, and no rock above the upper Snowshoe limestone is known.

Although the Snowshoe formation outcrops across a maximum width of 16,000 feet, its actual stratigraphic thickness is believed to be about 500 feet. The thickness of the basal conglomerate is estimated to be about 25 feet, the lower Snowshoe about 200 feet, the middle Snowshoe 200 feet, and the upper Snowshoe 100 feet. The full succession of the Snowshoe formation from basal conglomerate to upper limestone, reasonably uncomplicated by folding, is exposed on the east wall of Holmes Basin. There the total thickness is 500 feet or less.

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* *Geol. Surv., Canada*, Paper 38-16, pp. 7, 8.

The Snowshoe formation is an assemblage of competent and incompetent beds and is folded most complexly. Although available detail is not sufficient to outline accurately the form of the folding, nevertheless both the basal conglomerate and upper limestone are easily recognizable and enable the major structures to be interpreted. Exceedingly close isoclinal folds are present in some areas (*see* Plate V (B)), whereas elsewhere the form is vague or largely unknown. There are, however, numerous repetitions of beds that must represent close, overturned folding.

The Snowshoe formation includes the quartzites and limestone included by Lang in the Hudson member.

INTRUSIVE ROCKS

Intrusive rocks are extremely rare; only a few dykes were observed. The largest and most continuous dyke was mapped for a length of 8,500 feet between the heads of Simlock and Lostway Creeks. It is 100 to 150 feet wide and is essentially parallel to the strike of the foliation, but crosses it at a large angle by dipping steeply to the southwest. The dyke is a medium-grained diabase of even texture that in places weathers brown because of a high ankerite content. The enclosing Midas rocks near by are also highly ankeritized. This dyke is older than a number of northerly trending faults which cut it.

Two fine-grained massive and unsheared diorite dykes are exposed in the canyon on French Showshoe Creek downstream from J. Sockett's mineral showing. They are as much as 15 feet wide and are parallel to the steeply dipping foliation of the enclosing Yankee Belle rocks.

Diorite forms a small outcrop on the main road to Keithley Creek just west of the western margin of the area. It also outcrops on the ridge north of Luce Creek in an area several hundred feet long and as much as 50 feet wide. This diorite is unfoliated although it is considerably altered, the hornblende having been replaced by chlorite and the rock somewhat ankeritized.

Diorite forms outcrops at the forks of Simlock Creek 1,500 feet upstream from the Dawn Fraction (Lot 3493), on Copper Creek, and on Pearce Gulch.

These diabase and diorite dykes are similar to some of the Mount Murray intrusives of the Barkerville area.

Cream- to biscuit-coloured fine-grained rhyolite porphyry, containing occasional small quartz phenocrysts, outcrops for a length of 550 feet on the northwest side of the road along the ridge east of the head of Luce Creek, on the road leading down to the Snowshoe mine camp, on the ridge north of Luce Creek, and in Horseshoe Nail Gulch. Much float of the same sort is to be seen at the head of Little Snowshoe Creek. This rock is similar lithologically to some of the Proserpine dykes in the Barkerville area. The dyke at the head of Luce Creek is about 25 feet wide and is parallel to the foliation of the enclosing Snowshoe quartzites. The rhyolite porphyry is not foliated, ankeritized, or folded. The occurrence of all outcrops more or less along a line striking north 20 degrees west suggests that their position may be controlled by a line of faulting. There is no positive indication of age of these intrusions other than that they are younger than their Precambrian and (or) Cambrian host rocks, and younger than the second period of deformation.

A lamprophyre dyke occupies the Roundtop fault at the head of Lostway Creek. The fault appears as a prominent lineation cutting across the southeast slope of Roundtop Mountain, striking north 42 degrees east and dipping steeply southeast. Outcrops of dyke were seen on the headwall of Lostway Creek and also 700 and 900 feet to the northeast. The dyke is not sheared, has chilled margins, and weathers to a coarse sand composed of grains of olivine, augite, plagioclase, and biotite.

METAMORPHISM AND ROCK ALTERATION

All sedimentary rocks in the area were regionally metamorphosed during the first period of intense deformation. This metamorphism is manifested by the foliation (or schistosity) of almost all rocks, resulting from development in them of various amounts of sericite. Sericite in parallel orientation ranges from small amounts in the quartzitic beds of the Snowshoe, Midas, and Yankee Belle formations to a moderate amount in the argillaceous beds of the Midas, and to large amounts in rocks that are highly sericitic schists. Chlorite is a minor constituent of some rocks and a major constituent of the green schists in the lower part of the Yankee Belle formation and the upper Snowshoe member; there is no regional pattern of chlorite distribution.

An almost universal constituent of the rocks is ankerite. It occurs as disseminated grains, streaks, narrow veinlets, and porphyroblastic crystals. Solubility tests made on a variety of rocks show that certain Midas ankeritic quartzites contain as much as 50 per cent ankerite, and that most of the rocks contain about 3 to 20 per cent. The composition of this ankerite shows minor variations but is close to the molecular proportions of ankerite.*

This mineral, although present in varying amounts in almost all rocks, is not regarded entirely as an original constituent. In part at least it is considered to have been introduced by the numerous quartz veins which cut the Cariboo group. Many of these quartz veins contain ankerite, and it is generally observed that the country rock contains little or no ankerite where none is present in the quartz veins. For example, the Yanks Peak quartzite on Yanks Peak, the Snowshoe quartzite on the ridge northwest of Harvey B, and the rocks enclosing the Cornish Ledges and the Stockwork are as devoid of ankerite as are the quartz veins which are present in them. Elsewhere these quartzites, which normally are not ankeritic, contain moderate amounts of ankerite near ankerite-bearing quartz veins.

The cream and pale-buff weathered colour of some limestones is due to the presence of ankerite that has been introduced after the bleaching of the originally dark-grey or black limestone. In many instances the ankerite is observed as veinlets cutting the rock, or in areas related to fractured and bleached zones.

The occurrence of ankerite in the bed of ankeritic quartzite near the top of the Midas formation is believed to differ from these examples of ankeritization. This highly ankeritic rock occupies the same stratigraphic position over wide areas, and for this reason alone its ankerite is thought to reflect partly the original composition of the rock.

On Yanks Peak, black argillaceous silty quartzites are crossed by veinlets and fractures from which a zone of drab-olive to celadon-coloured alteration extends out into the wallrock. Fairly large areas of rock may be so affected. The colour in part appears to be due to the elimination of black carbonaceous material and in part due to the introduction of very finely divided ankerite which on weathering stains the rock surrounding it.

On the northeast flank of Yanks Peak, and between Harvey A and Harvey B, the Midas black silty quartzite has been bleached to a bone white or flesh colour. The flesh colour appears to be imparted to the otherwise white quartzites by minute disseminated grains of iron oxide. The areas underlain by these altered rocks lie near and along faults, and it is inferred that the fractured zones along the faults localized the alteration.

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* Analyses of ankerites from various places in the Cariboo are listed in Appendix B.

CHAPTER III.—STRUCTURAL GEOLOGY

SUMMARY OF STRUCTURE

The rocks of the Cariboo group are most intricately folded. To the northeast they are unconformably overlain by the gently folded Slide Mountain group of Mississippian age, and to the southwest by the moderately to steeply folded Quesnel River group of Jurassic age. The deformation of the younger overlying rocks and the presence of secondary structures of several ages within the Cariboo group itself indicate that the Cariboo group has experienced two or possibly three periods of deformation (*see* p. 37). Any implication that the Precambrian and (or) Cambrian rocks of the Cariboo group are less intensely deformed than rocks of younger age is wrong.[*]

FOLDS

Within the Yanks Peak-Roundtop Mountain area the structural features of regional significance are the general northwesterly strike of bedding and cleavage; the predominant parallelism of bedding and cleavage, except in the axial regions of folds; and the presence of regional southwesterly dips on the southwest side of a line about a mile east of Yanks Peak and of northeasterly dips on the northeast side.

The regional reversal of dip was interpreted by Bowman[†] as indicating a single huge anticlinorium. The subsequent regional descriptions by Uglow,[‡] Hanson,[§] and Lang[‖] have retained this original structural interpretation. The final concept was of a broad, simple, open anticlinorium involving huge thicknesses of rock. The form of the folding was considered to have been controlled by competent rock units such as the thick massive quartzites of the Richfield formation and the 2,500-foot-thick Barkerville limestone. These formations were thought to lie in large open folds, and the incompetent slates and thin-bedded and schistose members between them were dragfolded.

The first doubts as to the validity of this interpretation arose as a result of Benedict's[¶] underground geological mapping at the Island Mountain mine. A large dragfold mapped in detail was found to be exceedingly complex in form and was interpreted by him to indicate that in the mine area the Rainbow and Baker members[**] are overturned. Until that time no major overturning of rocks had been recognized. Subsequent detailed work at the Cariboo Gold Quartz mine by Skerl[††] supports Benedict's interpretations. Moreover, on a regional scale the old concept did not explain the absence of the Barkerville and Pleasant Valley formations on the southwest side of the presumed anticlinal axis.

The older ideas of regional structure were based upon mapping on a scale of 1 inch to 1 mile. The present detailed mapping was done on a field scale of 1 inch to 400 feet, and has been extended over a sufficiently large area for regional interpretations to be made. As a result, it is evident that not only is the stratigraphy as previously recognized incorrect, but that the old concept of the fold structure must be abandoned in favour of one that will satisfy the requirements of relationships newly established by detailed observations.

The interpretation proposed and elaborated on the following pages is that folding in the Yanks Peak-Roundtop Mountain area has been amazingly complex and that three major fold axes extend northwestward through the area. The southwestern major structure is an inverted fan-shaped anticlinorium having overturned folds whose axial planes dip southwest on its southwest limb and dip northeast on its northeast limb. This structure, whose axial plane lies to the west of Yanks Peak, is flanked on the northeast by an overturned syncline whose axial plane lies just west of Cunningham Creek. The syncline in turn is flanked to the northeast by a complex overturned anticline whose axial plane and core are marked by the outcrop belt of the Cunningham limestone. Moreover, a second generation of folding has flexed the older folds, and in so doing has not only complicated their form, but has developed a second cleavage.

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[*] *Geol. Surv., Canada,* Mem. 252, pp. 18, 29.

[†] *Geol. Surv., Canada,* Ann. Rept., 1887–88, Vol. III, Pt. I, p. 27c.

[‡] *Geol. Surv., Canada,* Mem. 149, p. 31.

[§] *Geol. Surv., Canada,* Mem. 181, p. 2.

[‖] *Geol. Surv., Canada,* Paper 38–16, p. 16.

[¶] *C.I.M.M.,* Trans., Vol. 48, 1945, pp. 755–770.

[**] The Rainbow and Baker members in Island Mountain mine are mapped as Snowshoe formation by A. Sutherland Brown.

[††] *Ec. Geol.,* Vol. XLIII, No. 7, 1948, pp. 571–597.

On a regional scale the rocks lie in a slight arc whose form between Wingdam and Quesnel Forks is indicated by the curved trace of the contact between the Quesnel River and Cariboo groups.* The full significance of this arc is not apparent beyond reflecting a change in regional bedrock trends of from north 60 degrees west in the area northwest of Antler Creek to trends of north 20 to 30 degrees west in the area southeast of Antler Creek.

FAULTS

The rocks between Willow River and Cariboo River are cut by a large number of northerly and northeasterly striking and generally easterly dipping normal faults. These faults are spaced at intervals of a few thousand feet. The northerly faults for the most part offset northeasterly dipping beds to the right, and drop the eastern or hangingwall side downward. Their most noticeable effect upon the fold structure is to compensate for the regional northwesterly plunge.

One northeasterly striking fault mapped by Lang on the northwest side of Roundtop Mountain as having an indicated horizontal displacement of about 3,000 feet, and thought by him† to extend southeastward to the head of Little Snowshoe Creek, does not exist. It is believed that the regional shifting of the traces of some beds may be due as much to the effect of regionally plunging folds as to the offsetting by northerly striking faults. The present concept of fold structure may explain many relationships that were previously explained by faults.

BASIS FOR THE INTERPRETATION OF STRUCTURE

For the most part the interpretations of structural forms must be built from numerous isolated observations. There are very few instances where exposure is so complete and an observation point so located that any major structure can be encompassed by the eye (*see* Plate VIII (A)). Once the possible complex pattern of folding is appreciated, it is apparent that the fold structures can be interpreted in the field only when (*a*) exposures are adequate, (*b*) distinctive members or beds are mapped in entirety, and (*c*) dragfolds and cleavage-bedding relationships are observable in critical structural positions.

The folds for the most part are isoclinal and overturned (*see* Plates V (B) and VIII (B)), and are recognized mainly because of the repetition of certain key beds. Structural interpretation of folding based on the attitude of bedding alone is of little or no value unless the position of an axial plane can be confirmed by the direct evidence of opposite facing dragfolds or the supporting evidence of cleavage-bedding relations near the axis of the fold (*see* Plates IV (A), V (A), and VII (B)).

During the course of mapping, a basic assumption was that the symmetry of a major structure is reflected in the symmetry of the minor dragfolds, that the schistosity of the rocks represents axial-plane cleavage (i.e., that it is developed parallel to the plane of symmetry of the individual folds), and that the plunge of small dragfolds is parallel to that of the next larger fold with which they are associated. No observations were made that might suggest that the general folding was of a type to which these fundamental relationships would not apply.

All structural interpretation is immeasurably complicated by the presence of secondary features such as folded cleavage, folded folds, and a fracture cleavage cutting across the regional foliation; all indicating a second period of deformation. These secondary features are widespread and are represented by the folded dragfold on the southeast ridge of Yanks Peak (*see* Fig. 4), by the small, rather open folds affecting individual beds or isoclinally folded septa of Midas rocks exposed in the Midas bulldozed cuts, and by folds whose form is not known, but whose inter-laminar movement has produced fracture cleavage which cuts across and distorts the older foliation (*see* Plate VI (B)). Structures of the first period of deformation are far more complex than those of the second.

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* *Geol. Surv., Canada,* Maps 335A, 563A, and 564A.

† *Geol. Surv., Canada,* Paper 38-16, p. 17.

All map compilations were made and all structural cross-sections were drawn in the field. The major features of all structural cross-sections were checked on the ground against the evidence of dragfolds and secondary structures.

STRUCTURE OF THE YANKS PEAK-ROUNDTOP MOUNTAIN AREA

Folds

General

The exact form of individual folds, whether they are major or minor in size, is not everywhere known nor everywhere determinable. Near Roundtop Mountain and Middle the outlines of folds drawn on the structural section (*see* Fig. 3) are fairly accurate, mainly for the reason that it was possible to map not only the Yanks Peak quartzite, but also the Cunningham-Yankee Bell contact. Elsewhere the parallelism of bedding and cleavage, except in the axial regions, is interpreted as meaning that most folds are isoclinal. West of Base Mountain there are four anticlinal septa of Midas rocks. These anticlines are isoclinal and are but a few hundreds of feet across. They outcrop in ribbons thousands of feet in length (*see* Fig. 2, Sheet A), indicating that their limbs are essentially parallel. The shape of the crest of the Yankee Belle anticline is indicated by the trace of the Midas-Yanks Peak contact and of the Midas-Snowshoe contact; these contacts also outline the keels of the two synclines at Aster B and west of the Hebson vein.

The amplitude of the folds, from crest to keel, is not known but probably is several thousand feet. In one instance a fold whose crest lies close to 6,000 feet elevation outcrops in French Snowshoe Creek at 4,800 feet elevation, indicating that the amplitude must be greater than 1,200 feet. Even though actual dimensions are seldom known, it seems to be a rule that the amplitude of any fold is several times the distance between its limbs. This proportion is so widespread in dragfolds and small structures (*see* Plate V (B)) which can be encompassed by eye that it cannot be doubted that the same proportion exists in larger structures whose presence and form are interpreted.

The regional plunge of fold structures, both small and large, is 10 to 20 degrees to the northwest even though minor reversals exist. This plunge is indicated not only by the plunges of dragfolds, but by the horseshoe-shaped trace of the beds involved in the Yankee Bell, Bee, and other anticlines. Most observed plunges range between 5 and 20 degrees northwest. Nevertheless, there are sufficient reversals of plunge, particularly in the area west of Base Mountain, to suggest that in some areas the fold axes are rippled and that the average plunge may be almost horizontal. The general horizontality of some folds is indicated further by the long, narrow outcrop patterns and the scarcity of outcrops of actual crests and keels of folds. No pattern of distribution was recognized in the reversals of plunge.

All folds, of no matter what size, are overturned (*see* Plates V (B) and VIII (B)). Those that lie west of the axial plane of the Jim syncline are overturned to the northeast, with their axial planes dipping southwest at angles of 40 to 70 degrees. Those lying east of the axial plane of the Jim syncline are overturned to the southwest, and their axial planes dip northeast at angles of 40 to 70 degrees.

Detailed

The three major fold structures of the area are the Snowshoe syncline, the Yankee Belle anticline, and the Cunningham anticline. The Snowshoe syncline is a huge, complex, overturned fold whose axial zone is within the belt of upper Snowshoe limestone lying west of Pearce Gulch and Peter Gulch. It is flanked on the southwest by the Yankee Belle anticline, whose axis lies west of Yanks Peak, and is flanked on the northeast by the Cunningham anticline, whose axis lies midway between Middle and Cunningham S. The position of the Cunningham anticline is marked by the outcrop of the Cunningham limestone, which occupies its core.

The key to the structural interpretation of the area was the unravelling of the fold structure of the rocks underlying Yanks Peak. This was possible only after the entire trace of the Yanks Peak quartzite had been mapped. The interpretation of the Yankee Bell anticline is based on the pattern of outcrop and areal distribution of the Yanks Peak and Midas formations.

The core of the anticline is composed of rocks of the Yankee Belle formation. These are outlined by the thin and sometimes discontinuous outcrop of the Yanks Peak quartzite which in turn is enveloped by the dark Midas formation.

The rocks are involved in an overturned isoclinal anticline whose axial plane dips southwest at about 50 degrees. The axial plane of the fold lies about 1,800 feet west of the summit of Yanks Peak.

The northwesterly plunge of the fold is indicated by the trace of the Yanks Peak quartzite and by the prong of Midas formation extending to the northwest. Even though plunges of minor dragfolds may range between 50 degrees northwest and 50 degrees southeast, the over-all plunge of the structure is between 10 and 20 degrees northwest.

The trace of the Yanks Peak quartzite outlines several large dragfolds, with amplitudes of as much as several hundred feet, on the flanks of the main anticline.

An extraordinarily complex dragfold called the Yanks Peak structure lies on the northeast side of the Yankee Belle anticline and forms a part of the overturned limb. It underlies the summit and southeastern ridge of Yanks Peak and is outlined by the trace of the Yanks Peak quartzite.

An area southeast of the Jews Hollow fault was mapped by plane-table on a scale of 1 inch to 100 feet. This particular section was selected because the Yanks Peak quartzite is well exposed at and above timberline and provides adequate outcrops for a detailed structural study. This one small, highly complex unit provides an example of the type of structure that may occur within the Cariboo group and should dispel any lingering belief in the simplicity of Cariboo folding.

Figure 4 shows in plan the outcrops of Yanks Peak quartzite that are exposed east of the Jews Hollow fault and on the southeast ridge of Yanks Peak. The areas of individual outcrop probably represent all the actual masses of quartzite that exist, because elsewhere it has been observed that the hard quartzite invariably outcrops if it is at the surface. Attitudes, where obtainable, indicate that the general strike is northwest and that most dips are southwest, except in the southwestern part where some dips are steeply northeast. Dragfolds and cleavage-bedding intersections indicate that the folds plunge to the northwest. During the course of mapping, it was difficult to realize that this scattered outcrop pattern must represent the continuous trace of a single uniform southwesterly dipping formation. The final interpretation was made only after the distribution of the Yankee Bell and Midas formations was satisfactorily established. This was difficult because these rocks do not outcrop well on the ridge-top. The cross-section on Figure 4 is a projection onto a vertical plane parallel to the Jews Hollow fault and a hundred feet or more east of it. It shows a large dragfold, with smaller dragfolds along its limbs, involving the Yanks Peak quartzite which has been stretched and broken apart. The dragfold has been involved in a second folding, and its synclinal element is bent into a second syncline whose axis is reflected in rocks at least 1,200 feet to the southeast. This synclinal axis appears to extend beyond Yanks Peak for possibly 2,500 feet to the northwest, and it is just possible that the axis may continue farther northwestward and actually may be the southern extension of the syncline that lies west of the Hebson vein.

It was not found practicable to devote more time to mapping the larger part of the structure that lies west of the Jews Hollow fault. It was observed, however, that the whole structure is unsymmetrical, for a cross-section northwest of Yanks Peak would be quite different in detail from this one which lies to the southeast. Moreover, southeast of Yanks Peak the axial plunge is northwestward and northwest of the Peak is southeastward, making the over-all structure sway-backed as well as laterally unsymmetrical.

North of Yanks Peak, rocks of the Midas formation are involved in two anticlines which are separated by a shallow syncline. The western anticline is an extremely thin septum* of Midas black silty quartzite outcropping along a north tributary of Little Snowshoe Creek. To the east of it a syncline extends from Little Snowshoe Creek through Aster B to Breakneck Ridge east of Holmes Basin. It is composed of rocks of the Snowshoe formation, ranging from basal conglomerate at Aster B to upper limestone at Breakneck Ridge. Its axial plane dips 50 to 80 degrees west, and its axis plunges 10 to 20 degrees to the southeast. Farther east Midas black silty quartzite outcrops in the second anticline which extends southeastward from the head of Aster Creek. Plunges along its length alternate between northwestward and southeastward.

The axes of both these anticlines probably extend for several thousand feet southeastward into the band of Midas rocks that outcrops on the ridge northeast of Yanks Peak.

A considerable amount of time was devoted to mapping the Midas formation on the ridge east of Jews Hollow and northeast of Yanks Peak (*see* Fig. 11). An area underlain by Midas formation and extending from the top of the ridge downhill almost to Snarlberg was explored by the Amparo Company by means of about 35,000 lineal feet of bulldozed trenches and roadways. This area was mapped on a scale of 1 inch to 100 feet. Exposures are practically restricted to bulldozed trenches, the intervening ground being largely covered with overburden. No completely satisfactory conclusion was reached because of the structural complexities and the lack of outcrops, except in the trenches. The structural interpretation illustrates not only the complexities of detailed fold structures in the less competent rocks, but also the structural environment of the Midas vein zone.

The interpretation is based on the assumption that the Midas formation includes three black silty quartzite members (*see* p. 20). The alternative assumptions, either that there are more or fewer black silty quartzite members, lead to difficulties which could not be reconciled with the present mapping of bedrock. These black silty quartzite members are reasonably distinctive and continuous, and are the only ones within the Midas that can be used as a basis for mapping. Their trace in Figure 11 reveals the structure.

Between the Yanks Peak quartzite and the Midas fault, just west of the Saddle shaft, the lowest silty quartzite is involved in three small but distinct anticlines. Their presence is indicated by exposures on the east rim of Jews Hollow but not on the ridge-top farther east where outcrops are obscured in an area of frost-heaved slabs.

The displacement along the Midas fault could not be determined because it crosses no distinctive beds whose displaced ends could be recognized and matched.

East of the Midas fault the middle black silty quartzite member is involved in two large and exceedingly complex anticlines whose form in section is indicated by the surface outcrop of the beds. These two anticlines are possibly the southeastern extension of the two structures at Aster B. The keel of the intervening syncline was not observed, and this may indicate that it extends to considerable depth.

The upper black silty quartzite member lies near the Snowshoe contact and is involved in several large dragfolds which make its trace extremely sinuous. At 5,750 feet elevation the middle and upper black silty quartzite members are separated by about 700 feet of grey argillaceous schist, and at 5,300 feet elevation they are only about 100

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* Septum is used to describe the long, fairly tall, and fairly narrow partition-like form in which rocks may occur. It so happens that many septa in the area are anticlines which are tightly compressed.

feet apart. The Midas vein zone lies within this wedge-shaped segment of intricately folded schists.

The traces of beds on the southeast slope of the ridge are exceedingly complex. This is partly because the slope of the hill, about 10 to 12 degrees southeast, is almost parallel to the plunge of some of the minor dragfolds, and partly because a second deformation has refolded the older structures. As a consequence, fold axes plunging less than 12 degrees southeast will emerge from the ground, and those greater than 12 degrees southeast will penetrate it. Although second-generation structures are fairly gentle, and may in part be deduced from dragfolds and cleavage, they may be difficult to map. The step-like trace of the upper black silty quartzite as it rises near the eighth switchback is a result of the second deformation.

A dominantly synclinal belt, the Snowshoe syncline, lies to the northeast of these structures and of the main outcrop area of Midas formation. It is largely occupied by rocks of the Snowshoe formation, but west of Base Mountain it contains a few long, narrow ribbons of Midas rocks which represent anticlinal septa protruding into the southwestern limb of the syncline. The major axis of the syncline lies within the belt of upper Snowshoe limestone that extends northwestward from the Shasta No. 2 claim (Lot 9821) through the junction of Pearce Gulch and Peter Gulch, and through the canyon on Cunningham Creek 2,000 feet southwest of its junction with Peter Gulch. The northeastern flank of the syncline lies at the Quartz Comb, a bed of white silicified quartzite which is correlated with the Yanks Peak quartzite. The distance between the two limbs of the Snowshoe syncline measured across strike between the nearest outcrops of the Yanks Peak quartzite on Yanks Peak and on Middle is 36,000 feet.

Southwest of Base Mountain, three anticlinal septa of Midas rocks protrude into the southwestern limb of the Snowshoe syncline. The Jim syncline lies between the two western anticlines. The westernmost anticline crosses French Snowshoe Creek at 4,850 feet elevation about 2,000 feet north of Snarlberg, and extends to the head of Horseshoe Nail Gulch. Its outcrop is from 300 to 400 feet wide and about 15,000 feet long. The axial plane of the fold dips 50 to 80 degrees to the southwest, and its crest is exposed at an elevation of 6,000 feet. The anticline is at least 1,150 feet high between isoclinal limbs 300 to 400 feet apart. Two small southeasterly plunging anticlines are exposed at Horseshoe Nail Gulch, southwest of this structure.

The other anticlinal septa of Midas black silty quartzite lie to the east of the Jim syncline. One crosses the head of French Snowshoe Creek, and the other extends northwestward from Harvey A. Both are overturned and dip northeastward at about 50 degrees. The outcrop pattern of both indicates that the flanks of the two anticlines are complicated by smaller dragfolds.

The Jim syncline is a rather unusual structure which has been traced continuously between the head of Horseshoe Nail Gulch and French Snowshoe Creek. In vertical section the syncline has an unsymmetrical bag-like shape with downward diverging limbs (*see* Fig. 3). It is occupied by a belt of Snowshoe rocks and is bounded to the east and west by anticlinal septa of Midas black silty quartzite. The axial plane of the western anticline dips 50 to 80 degrees southwest, that of the eastern about 50 degrees northeast, and in the central part of the syncline the beds are vertical. The syncline marks the regional change between southwesterly dipping cleavage and bedding on one side and northeasterly dipping cleaving and bedding on the other. For many miles to the northeast, beyond the limits of the present map-area, all axial planes dip northeast. The axial plane of this syncline is thought to correspond with that of Bowman's anticlinorium, for both mark the line of change between opposite dipping cleavages.

The exact form of the folding between Base Mountain and the core of the Snowshoe syncline at Pearce Gulch is not known because of the absence of easily recognizable units within an area almost entirely underlain by lower and middle Snowshoe members. Close repetitive folding in these rocks is revealed by the sixfold repetition of a coarse-grit bed on Base Mountain and by the repetition of chlorite schist in numerous bands along the road south of the bridge across Peter Gulch.

The axis of the Snowshoe syncline lies within the outcrop belt of the upper Snowshoe member which extends northwestward from the Shasta No. 2 claim (Lot 9821) through the junction of Pearce Gulch and Peter Gulch to the canyon on Cunningham Creek about 2,000 feet upstream from the junction of Peter Gulch. On the Shasta claims close isoclinal folding is indicated by the numerous long outcrops of upper Snowshoe limestone. This limestone on Peter Gulch and Cunningham Creek is dragfolded and considerably thickened, and appears to be in the axial zone of the major fold (*see* Plate V (B)).

The northeastern limb of the Snowshoe syncline is overturned. On it the lower and middle Snowshoe members are repeated, but not to the same extent that they are on the other limb. There is much close repetitive folding, particularly in the upper part of the Midas, disclosed by the outcrop pattern of the upper Midas limestone. This member outcrops in numerous long bands across a width of 4,000 feet northeast of the Bralco cabin. Although the limestone may be not more than 25 feet thick, it forms numerous thick outcrops along Copper Creek. North of the mapped area it forms numerous parallel ribs crossing Cunningham Creek downstream from Palmer Bench. Neither the precise outline of the structure nor the number of the many individual folds is known, but the tightness and repetitive nature of the isoclinal folding is apparent from the outcrop pattern of this readily recognizable limestone.

The Cunningham anticline lies on the northeast side of the Quartz Comb where Yanks Peak quartzite reappears at the surface on the northeastern side of the Snowshoe syncline. The core of the anticline is occupied by the Cunningham limestone, which forms a continuous wide band extending northwestward from Sixbee Creek. Axial planes of the folds dip to the northeast, and the folds in the limestone appear to be smoother and larger than the more acute ones in overlying formations. The thinly bedded upper part of the formation is intensely dragfolded on a small scale.

Little is known of the northeastern limb, other than that the Yanks Peak quartzite, which outlines the folds so well on the southwestern limb, outcrops prominently along the ridge extending in both directions from Cunningham S. The distance from Yanks Peak quartzite on the limb at Cunningham S to the southwestern limb at the Quartz Comb is about 12,000 feet.

The mapping of the Yanks Peak quartzite and of the Yankee Belle-Cunningham contact has enabled the shape of the southwestern limb of the anticline to be interpreted in reasonably complete detail. Several large northwesterly plunging dragfolds having an amplitude from crest to trough of about 2,000 feet and numerous very much smaller ones are shown in cross-sections A-A^3 and D-D^1 of Figure 3.

Description of Structural Cross-sections

Four cross-sections have been drawn to provide a graphical illustration of the fold structure. A single long section, A-A^3, completely crosses the area from Yanks Peak to Cunningham S. The three other sections on Figure 3 illustrate structural features along selected lines.

All structural sections were drawn in the field, and, wherever possible, outcrops along the lines of section were re-examined in order to substantiate the structural interpretation. The accuracy of the sections ranges downward from the reasonably accurate section D-D^1 and the northeastern end of section A-A^3 between Middle and Cunningham S, where information is fairly complete; to the diagrammatic representation of the form of the folds in A-A^3 southwest of Harvey A, in B-B^1, and in C-C^1, where many uncertainties are involved in projecting dips, strikes, and plunges for more than a few tens of feet. The central part of section A-A^3 between Harvey A and Middle is the most diagrammatic because of the scarcity of marker beds and the general lack of specific knowledge in the central part of the area. It is only when the trace of a single bed is thoroughly known that the form of a fold can be interpreted with confidence. Sections drawn on the basis of a large amount of detailed information may be found, when checked in the field, to be considerably less complex than the structures they represent.

*Section A-A*³.—The line of section A-A³ extends in a direction of north 50 degrees east from French Snowshoe Creek in the extreme southwest of the map-area to Harvey A on Base Mountain, and on Sheet A of Figure 2 the section line is marked A-A¹. There is a break in the line of section at Base Mountain. The continuation, marked A²-A³ on Sheet B of Figure 2, extends through Middle to Cunningham S in a direction of north 40 degrees east.

The Yankee Belle anticline with its core of Yankee Belle formation is at the southwest end of the section. The overturned fold is outlined by the Yanks Peak quartzite and is surrounded by an envelope of Midas rocks. There are large dragfolds on the limbs of the fold. The intricate internal structure of the Midas rocks on the northeast side of Yanks Peak is shown diagrammatically.

To the northeast, near French Snowshoe Creek, is the Jim syncline with its filling of Snowshoe rocks. It is flanked on the southwest by a single southwesterly dipping anticlinal septum of Midas rocks and on the northeast by two northeasterly dipping anticlinal septa of Midas. Exposures on and west of Base Mountain indicate that there are numerous dragfolds on the limbs of the two main anticlines. The main feature of the central part of the section is the axis of the Snowshoe syncline marked by the belt of upper Snowshoe limestone west of Pearce Gulch.

The northeastern end of the section shows the Cunningham anticline. The folds on its southwestern limb are drawn with reasonable accuracy. The thinning and tearing apart of the Yanks Peak quartzite on the flanks of the anticline at Middle are well displayed. This anticline extends northward to Roundtop Mountain with minor changes in shape.

To the northeast a second anticlinal dragfold is outlined by the trace of the contact between the Yankee Belle and Cunningham formations. These folds plunge northwestward at 10 to 20 degrees, and the southwesterly projections of the folded outline of the Yanks Peak quartzite and the Yankee Belle-Cunningham contact lie at a considerable elevation above ground surface on the ridge east of Nolaka Creek.

*Section B-B*¹.—The line of section B-B¹ follows the top of the ridge north of Luce Creek in a direction of north 66 degrees east. The eastern side of an anticline extending from the head of Aster Creek is at the southwestern end of the section, and in it the thin upper member of Midas black silty quartzite is repeated many times across a width of 900 feet. To the east, ankeritic quartzite and limestone are repeated several times in a minor synclinal belt before the upper Midas black silty quartzite reappears at the surface and is repeated several times in steep, tight, isoclinal folds. Farther east is the lopsided Jim syncline, with a very thin anticlinal septum of Midas black silty quartzite protruding into it. The section ends at an anticline of Midas black silty quartzite.

*Section C-C*¹.—The line of section C-C¹ runs due east from Horseshoe Nail Gulch to the head of Cunningham Creek northeast of the Cornish Ledges. A southwesterly dipping anticline lies at the western end of the section. East of it are two small southwesterly dipping and southeasterly plunging anticlinal septa. Farther east is an anticline whose crest near Horseshoe Nail Gulch is at 6,000 feet elevation and which is continuous to French Snowshoe Creek at 4,850 feet elevation. On Horseshoe Nail Gulch the axial plane of the anticline dips northeast, whereas on section B-B¹ along the ridge north of Luce Creek it is more or less vertical, and at the ridge northeast of Yanks Peak and on section A-A¹ it dips to the southwest. No other individual structure is known to be similarly twisted. Farther east is the northeasterly dipping Jim syncline, flanked on its eastern side by an anticlinal septum of Midas upper black silty quartzite.

*Section D-D*¹.—The line of section D-D¹ passes through Roundtop Mountain in a direction of north 41 degrees east. The anticlinal dragfold delineated by the Yanks Peak quartzite has essentially the same shape as on the northeastern end of section A-A^3. The Yankee Belle rocks in the core of the anticline and immediately below the hood of Yanks Peak quartzite are extremely closely folded on a small scale, yet at the same time they accommodate themselves to the over-all form imposed by the Yanks Peak quartzite.

FAULTS

Faults are a relatively inconspicuous surface feature in the Yanks Peak-Roundtop Mountain area, and on the ground one is impressed more by the schistosity and the fold structures of the rocks. Actually, faults are fairly numerous, but most are found only as the result of detailed mapping. However, some faults shown on the accompanying geological map may be observed, and are naturally exposed on the steep north face of Yanks Peak (*see* Plate II (A)), in the Yanks Peak quartzite along the belt striking through Roundtop Mountain and Middle, or are exposed by surface and underground mine workings. The other faults are inferred.

In detailed mapping where outcrops are none too plentiful, a very real difficulty may be encountered in determining whether an offset bed has been displaced by a fault or by a plunging dragfold whose median limb has been greatly stretched or completely pulled apart. In many instances, exposures are too scarce to resolve the problem.

Most faults observed have a northerly to northeasterly strike between about north 20 degrees west and north 55 degrees east, and have an easterly dip. They are characteristic members of a general group of predominantly normal faults that is present throughout the mining area of the Cariboo. On many faults the movement has been mainly a down dropping of the eastern block, thus flattening the over-all northwesterly plunge of the folds and compensating for the regional plunge. On others the movement has been largely horizontal, as indicated on the walls of some fault planes by striations plunging at small angles either to the north or south. Elsewhere the direction of movement is disclosed by steep northerly plunging dragfolds of small amplitude.

The Jews Hollow fault lies on the east side of Jews Hollow, where it is prominently exposed on the headwall, and runs southward across the southeast ridge of Yanks Peak. It has been mapped for a length of about 2,000 feet and has produced a right-hand horizontal separation of the formation of about 250 feet along the fault plane.

About 400 feet to the west of it, and also exposed in the headwall of Jews Hollow, is another northerly striking fault with a right-hand horizontal separation of about 30 feet.

Northerly striking faults of unknown displacement are observed along the wall of the Imperial vein at the head of Little Snowshoe Creek, underground in the Intermediate and Low levels of the Snowshoe mine, along the Saddle vein, and in open-cuts made by J. Sockett on the south side of the main bend of French Snowshoe Creek. These points are more or less in line, but it is uncertain whether they represent a single continuous fault or a number of similarly striking faults. Other northerly striking faults are exposed underground in the Jim adit, in the Midas adit, and in the Plateau d'Or open-cuts. A large fault was crossed by the Yankee Belle adit (now inaccessible) about 700 feet from the portal. It is thought to belong to this group of northerly striking faults.

Three main faults, largely disclosed by the detailed mapping of the Yanks Peak quartzite, and of the contact between the Yankee Belle and Cunningham formations, lie to the southeast of Roundtop Mountain. The southeasternmost of the three, the Simlock fault, is the largest fault in the area. It follows an exceedingly sharp notch between the heads of Nolaka and Simlock Creeks, striking about north 10 degrees east. The extension of this fault southward beyond the limits of the area may account for the offset of limestone beds along a depression northeast of the junction of Simlock and Harvey Creeks.

The movement on the Simlock fault, as judged by the displacement of the crest of an anticline of Yanks Peak quartzite, was almost wholly horizontal and resulted in a left-hand separation of about 800 feet along the fault plane. Numerous small flexures in the Midas beds near the fault confirm the direction of relative movement.

Two smaller faults in the cirque at the head of Nolaka Creek are probably branches of the main Simlock fault. One has an apparent left-hand separation of about 200 feet and the other a 50-foot right-hand separation. Beds visibly offset on opposite sides of two small creeks make these faults clearly evident, but their continuations are uncertain because of lack of outcrops in the talus at the head of the cirque.

The Lostway fault is inferred between Middle and Roundtop Mountain because all fold structures on Middle and Roundtop Mountain plunge northwestward at 10 to 20 degrees, and the lack of reversal in plunge indicates that a fault has dropped the structures to their known position on its southeast side. The Lostway fault is assumed to strike north 27 degrees east and to lie along the northwest side of the head of Lostway Creek. Additional evidence of faulting is the displacement of the limestone contact just northwest of Lostway Creek and of the diabase dyke in the saddle between Roundtop Mountain and Middle. The amount of throw* is estimated to be about 550 feet. The estimate is based on the relative displacement of the axis of an anticline outlined by Yanks Peak quartzite and on the assumption that the average plunge is 10 degrees northwestward. A second estimate of the throw, based on the displacement of the Yankee Belle-Cunningham contact, is about 300 feet downward on the southeast side of the fault. There was probably a small amount of right-hand horizontal movement as well.

The Copper Creek fault is inferred because of the offset of the Midas-Snowshoe contact below the bridges on Copper Creek and of the belt of upper Snowshoe rocks that lies south of the junction of Peter Gulch and Pearce Gulch. Surface trenches near the southwest corner of the Cutler No. 1 claim (Lot 10596) disclose northerly striking faults that are assumed to be strands of the larger Copper Creek fault. The fault has a bearing of north 13 degrees east and a total right-hand horizontal separation of about 600 feet along the fault plane.

The Roundtop fault is visible as a prominent lineament cutting across the southeast slope of Roundtop Mountain (*see* Plate VIII (A)). It is occupied by an unsheared lamprophyre dyke. The fault has an average strike of north 55 degrees east and dips steeply southeast. Striations plunging 40 degrees eastward on a slickensided plane dipping 80 degrees southeast show the direction of the last fault movement. An estimate, based on the displacement of fold structures on opposite sides of the fault, indicates a throw of about 350 feet and a heave† of about 700 feet, the southeast side having moved down and to the northeast (left).

Gouge or pulped rock, in layers several feet thick and conformable with the bedding, has been observed on the surface and in underground workings. These layers probably formed by concentration of movement in certain soft beds, and may represent an extreme of interbed slippage during shear folding. An example is the crush zone 200 feet west of the Saddle shaft. Alternatively, these gouge or crush zones might represent strike-faults, but there is no evidence that they cross the bedding in the axial regions of the folds. No large strike-faults such as have been described‡ in other parts of the Cariboo region are known in the area.

CLEAVAGE

Flow cleavage of varying degrees of perfection is regionally developed in all rocks in the area, with the exception of a few of the intrusive rocks and some of the more completely ankeritized or silicified rocks. The cleavage ranges from widely spaced planes in thickly bedded coarse quartzite, through ¼- to 1-inch spacing in flaggy impure quartzite, to highly fissile slate and papery schist. The degree of fissility depends mainly on the amount of sericite that has been developed in the rock, and to a lesser extent the position of the rock in relation to the crest or limb of a fold.

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* Vertical component of dip-slip.

† Horizontal component of dip-slip.

‡ *Geol. Surv., Canada*, Mem. 149, p. 36; Paper 38-16, pp. 13, 16.

In all the smaller fold structures the cleavage is seen to be parallel to the axial planes of the fold (*see* Plate V (B)) and is taken to be axial plane or flow cleavage. By extension it is inferred that this regional cleavage is parallel to the axial planes of major folds.

In most instances the cleavage is parallel to the bedding of the rocks. If it is also parallel to the axial plane, it must be inferred that the folds are isoclinal. It is only at and near the crests or keels of folds that bedding is seen crossing cleavage (*see* Plates V (A) and VII (B)). The angular relationships between bedding and flow cleavage were used for structural interpretations.

In a few instances a bedding cleavage* as distinguished from flow cleavage is seen in the axial region of a fold where it is parallel to the bedding and obviously not parallel to the axial plane.

One of the difficulties in mapping complex structures in detail is that areas of poor outcrop contain too little information in the axial regions of the folds. Under uniform conditions, rocks in the axial region are more broken than those on the limbs and consequently are less capable of outcropping. One valuable clue to the location of an axial zone is the presence of the rod-like fragments which result from the rock breaking along both cleavage and bedding planes when they are almost at right angles to each other. Where no outcrops are present, one may safely infer the near-by presence of an axial zone when a rubble of pencil-shaped or rod-like pieces is seen.

In places the well-developed flow cleavage or schistosity has been folded during a second, younger period of deformation. This folding has been accompanied by slippage along the planes of foliation rather than along the planes of the original bedding. The younger folding is fairly gentle and open, but is nevertheless accompanied by its own flow cleavage, which is parallel to the axial planes of the secondary folds, and cuts across the older cleavage at various angles.

Fracture cleavage cutting across the flow cleavage is widespread in a belt on the eastern side of the Jim syncline (*see* Plate VI (A)). The cleavage planes normally are spaced 1 to 2 inches apart. West of the axis of the Jim syncline the fracture cleavage dips 10 to 30 degrees southwestward, and east of the axis of the Jim syncline the fracture cleavage dips 15 to 30 degrees northeastward. In some instances the older cleavage planes, between the crosscutting planes of fracture cleavage, are bent into either normal or reversed sigmoid curves (*see* Plate VI (B)), indicating that there has been slight movement along the fracture cleavage surfaces. Too few observations were made to establish a pattern of direction for this movement.

JOINTS AND FRACTURES

Almost all the rocks in the area are intersected by joints. The joint-planes are vertical or dip steeply, mainly to the southeast, and the strike of almost all of them lies between north 40 and north 85 degrees east; most of them strike north 45 to 70 degrees east. In most instances the strike of a joint-plane is within a few degrees of being at right angles to the strike of the schistosity of the enclosing rock, and the dip is almost at right angles to the plunge of the fold structures. Most variations in strike of the rocks are accompanied by a change in the orientation of the joints. Joints of the group that are essentially at right angles to the plunge of the fold structures are believed to be extension (*ac*) joints that were formed during the initial folding.

In some instances, movement has taken place along a northeasterly striking fracture which may have originated as a joint. The strike of associated tension fractures is either easterly or northerly, depending on whether right- or left-hand movement was involved (*see* Fig. 5).

Some quartz veins occupy fractures striking between north 80 degrees east and south 65 degrees east. Several of these veins show evidence of movement along their walls, and it is evident they occupy subordinate shears. Other veins occupying fractures striking

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* M. P. Billings, "Structural Geology," *Prentice Hall*, 1942, p. 218.

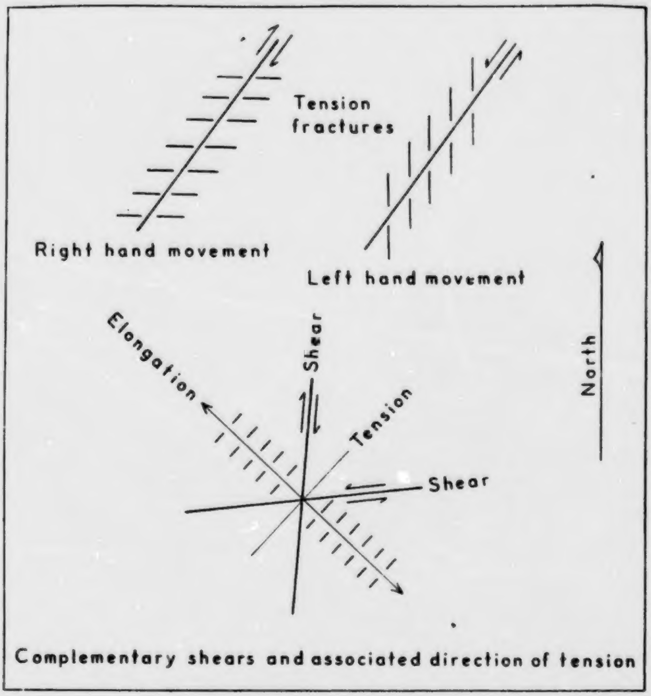

Figure 5. Diagram showing tension fractures in relation to direction of fault movement, and also complementary shears and their associated direction of tension.

north 40 to 60 degrees east are commonly associated with them (*see* Fig. 5). Combinations of these two fracture directions are associated with northerly striking normal faults with right-hand displacements. It is believed that the easterly striking fractures and the northerly striking faults represent complementary shears. Normally the associated tension would be released by the formation of a set of northeasterly striking fractures, but because northeasterly striking extension joints already existed it is believed that the associated tension merely reopened pre-existing extension joints. Furthermore, any northeasterly striking fractures, especially those originally formed in tension, would be reopened by a continuation of right-hand movement along a northerly striking fault.

LINEATION

Linear structures are developed in the rocks in the area, and almost without exception the lineation strikes in a northwesterly direction and plunges either northwest or southeast, parallel to the regional plunge.

The features most commonly seen are dragfolds with amplitudes of a few inches to a few feet, and pencil- or rod-like fragments produced by breaking along cleavage and bedding planes more or less at right angles. Under favourable circumstances the trace of bedding on axial-plane cleavage may be observed in the axial zone of a fold; the plunge of the trace conforms with the regional plunge. The cleavage planes of argillaceous schists of the Midas formation commonly are crinkled in chevron-like folds ranging down from an amplitude of about 1 inch to a crepe-like puckering.

The pebbles in the basal Snowshoe conglomerate have been only slightly elongated and now possess the general proportions of pumpkin seeds. They are flattened in the plane of foliation, and their longest axis lies parallel to the structural plunge.

AGE OF STRUCTURAL FEATURES

The age of structural features cannot be determined from observations within the area but must be based upon regional information. The complex early folding of the Cariboo group does not involve the Mississippian Slide Mountain group, which is more gently folded, nor the Jurassic Quesnel River group, which locally may be sharply folded. The age of the early folding, therefore, must be pre-Mississippian. If the Lower Cambrian formations lie conformably* above rocks of the Cariboo group in the Little River area, then the early deformation must be post-Lower Cambrian in age.

Open folds and other secondary structural features were developed in rocks of the Cariboo group by later deformation. The fact that Jurassic rocks are deformed indicates that some deformation was post-Jurassic. However, the suggestion that the intensity of the folding in the Slide Mountain and Quesnel River groups may be different raises the possibility that some of the deformation may be post-Mississippian and pre-Triassic† in age. Two ages of post-Mississippian secondary structures in the Cariboo group rocks cannot be distinguished.

The precise age of the faulting is not known. The northerly and northeasterly striking faults cut the Cariboo group and all fold structures within those rocks. They are known to cut the Slide Mountain group in the Antler area‡ and cut diabase dykes, correlated with the Mount Murray intrusions of uncertain age, in the Yanks Peak-Roundtop Mountain area. They must be post-Mississippian in age, and even though they are not definitely known to cut the Quesnel River group, the fact that the faults themselves are not deformed suggests that they are post-Jurassic in age.

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* *Geol. Surv., Canada,* Paper 38-16, p. 13.

† Evidence is presented in *Geol. Surv., Canada,* Mem. 252, 1949, pp. 42, 43, 121, that suggests pre-Upper Triassic deformation in the Fort St. James area.

‡ A. Sutherland Brown, personal communication.

CHAPTER IV.—ECONOMIC GEOLOGY

INTRODUCTION

Gold has always been the metal of chief interest to miners in the Yanks Peak-Roundtop Mountain area. The importance of the area, if judged solely upon the value of gold produced, may not appear very great in view of the total recorded lode-gold production* of only 5,204 fine ounces. Furthermore, the amount of placer gold recovered, although not accurately known, is estimated to be small and may be little greater than the amount of lode gold. Nevertheless, the area lies at the heads of three important placer creeks—namely, Keithley, Harvey, and Cunningham Creeks—and contains the outcrops of numerous gold-bearing quartz veins.

The presence of gold-bearing veins at the head of Luce Creek and of rich placers on the lower part of Little Snowshoe Creek indicates that a locus of gold mineralization lies near Yanks Peak. Work was initiated there in continuation of a study of the placer- and lode-gold occurrences of the Cariboo, a study that was begun in the vicinity of Stanley†. Near Yanks Peak it was known that reasonably numerous outcrops were present. Moreover, it was hoped that an understanding of the structural environment of the veins might be useful in guiding further exploration, not only within the area itself, but in other parts of the Cariboo.

As the work progressed, it became increasingly apparent that practically all former stratigraphic and structural ideas regarding Cariboo geology needed revision, and, as a consequence, the mapping was extended beyond the original Yanks Peak area to include the Cariboo Hudson mine and Roundtop Mountain. The mapping has been further extended by A. Sutherland Brown from Roundtop Mountain to the vicinity of the mines at Wells. A considerable amount of time was devoted to working out some of the complex folds, because elsewhere in the Cariboo folds have been extremely important in localizing replacement mineralization and in controlling the position of certain rocks whose response to fracturing has made them more susceptible to vein mineralization. Some of the vagaries of vein occurrence, such as their non-persistence along strike or at depth, may be explained by changes in host rock resulting from intricate folding. It is hoped that the present interpretation of fold structures in the Yanks Peak-Roundtop Mountain area will provide basic ideas applicable to prospecting and exploration throughout a far larger area in the Cariboo.

EARLY HISTORY OF LODE-MINING

Many of the early placer-miners were familiar with lode deposits and were interested in their discovery, and from time to time discoveries were made. Although only a small amount of lode prospecting was done at the time of the early placer activity, some important quartz veins were found. However, none of the outcropping veins was rich enough to be worked profitably by arrastre, and extensive development of the veins awaited better transportation facilities and the higher price of gold that has prevailed since 1932.

In December, 1862, three claims were recorded‡ on a quartz vein on the right bank of Little Snowshoe Creek (the identity of this vein is not known). A few months later, in April, 1863, Thomas Haywood, Edward Jeffrey, and eleven others, calling themselves the Douglas Company, recorded claims on the Douglas vein§ at the head of the creek now called Luce Creek. The Douglas vein is on the Old Timer claim (Lot

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* Largely from the Cariboo Hudson mine, but including the production from a small mill operated on the Midas property during the summer of 1949, and a small production from the Rand. The amount of gold recovered by arrastre from the Haywood vein is not known but could not have been very large.

† *B.C. Dept. of Mines*, Bull. No. 26, 1948.

‡ Recorded by L. D. Loucks, P. O. Coote, and C. T. Seymour.

§ The Douglas vein was later known as the Haywood vein or the Arrastre vein.

11337),* and the Lower Arrastre adit shown on Figure 13 is driven on it. Haywood and Jeffrey had written the Colonial Secretary on October 25th, 1862, announcing their discovery of the vein and requesting discovery privileges. Their request was responsible for the enactment of the first regulations concerning simple partnerships for mines. The discovery of the Douglas vein led to a rush of quartz-claim stakings on Little Snowshoe Creek in the early spring of 1863. William Luce's name first appears when he recorded a claim in May, 1863.

In June, 1863, H. W. Steele and seventeen others, calling themselves the Monte Christo Company, recorded eighteen quartz claims† on French Snowshoe Creek, running 900 feet up each side of the valley from the creek and said by them to be about 1¼ miles downstream from the upper forks. This company probably drove the Steele and Cunningham tunnel which is shown on Bowman's map of Little Snowshoe and Keithley Creeks, but whose precise position on the ground is unknown.

In August, 1864, Thomas Haywood, G. W. Anderson, William Luce, and eight others, known as the Rising Sun Company, recorded eleven claims on a quartz vein on Little Snowshoe Mountain‡ (the above location is not positively identified with present showings, but it may be on what are now known as the Talbot and Corban showings).

In July, 1869, A. Johnson, B. Gallagher, and Rees Davies recorded three discovery quartz claims on a north fork of Little Snowshoe Creek. These may have been on what is now known either as the Hebson vein or the Imperial vein.

The Cariboo Sentinel§ of August 28th, 1875, reports "an assay of quartz from a ledge on Snowshoe now being prospected by Mr. Thos. Haywood was made last week at the Government Assay Office. The result, 7 oz. silver and 2 oz. gold to the ton. The Ledge is well defined and has only been sunk on a few feet. [This vein is not identified with any known today; it may be either a vein near the old Douglas vein or some vein near the Holmes Ledge.] Mr. Holmes is also sinking on a ledge in the same neighbourhood and is down about 30 feet."

In September, 1875, William Holmes recorded a claim on a quartz vein (the Holmes Ledge) on a small creek emptying into Swift River between Six Mile Creek and McMartin Creek. The next year Thomas Haywood recorded a claim adjoining the one belonging to Holmes. The Cariboo Sentinel of September 25th, 1875, reports that an assay made by the Government Assay Office of a sample from the Holmes Ledge revealed a content of 14 oz. 17 dwt. 11 gr. silver, and 19 dwt. gold per ton.

In 1886 Veith and Borland relocated the old Haywood vein (Douglas vein), cleaned out the old adit, and shipped out some vein quartz for a test. Additional work was done the next year, but thereafter nothing appears to have been done for many years. The claims lapsed, and the ground was relocated by R. Reinhold in 1928. It was Reinhold and his partners who optioned the group of claims to Fred Wells when he organized Snowshoe Gold Mines Limited in 1937.

No records of quartz locations on Cunningham Creek are available before Bowman's visit to the creek in 1885. At that time he sampled the Quartz Comb near Roundtop Mountain and also several veins exposed by placer operations at Sharp's Bench and farther downstream.|| No further lode activity is noted until the original Cariboo Hudson claims were located in 1922. The showings on these claims, and other showings farther down Peter Gulch, received only intermittent attention until the early 1930's, when interest in gold prospects in the area revived with the advance in the price of gold.

Lode activities since the early 1930's are recorded individually under the various properties described in Chapter VI, page 57.

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* The lot numbers of all surveyed claims are listed numerically in Appendix A, pp. 90, 91.

† Quartz claims at that time were 100 feet square.

‡ Yanks Peak was known to old-timers as Little Snowshoe Mountain.

§ The Cariboo Sentinel was published in Barkerville from 1865 to 1875.

|| *Geol. Surv., Canada*, Ann. Rept., 1887–88, Vol. III, Pt. I, pp. 43c, 44c.

GENERAL CHARACTERISTICS OF THE QUARTZ VEINS

The numerous quartz veins in the Yanks Peak-Roundtop Mountain area vary greatly in size, ranging in width from a few inches to tens of feet, and in length from a few tens of feet to more than a thousand feet. Regardless of their size, they may be grouped on the basis of their general strike into three main classes—northerly striking, northeasterly striking, and easterly striking. Northwesterly striking veins, that are generally parallel to the strike of the rocks and either dip with the bedding or cut across it, are rare.

The northerly striking veins occupy faults or shears which strike between north 10 degrees west and north 10 degrees east and dip steeply eastward. All the large veins in the area belong to this group. The longest is the Hebson vein, whose length is about 1,600 feet, and the widest is the Imperial, whose greatest width is about 40 feet. The main veins belonging to this group are the Hudson, Hebson, Imperial, Snowshoe, Pauline, Betty, Lipsey, and Saddle veins.

The northeasterly striking veins occupy tension fractures striking between north 40 degrees east and north 80 degrees east and for the most part dipping steeply southeastward. Only in rare instances has there been movement along fractures of this direction. These veins generally are from a few inches to a foot or more wide and are seldom more than 100 feet long. Veins of this group generally occur in swarms. In most instances they are associated with a northerly striking fault having right-hand movement, or with a northerly striking vein which occupies a shear or fault. The strike of these northeasterly veins is more or less at right angles to the strike of the formation and to the plunge of the fold structures. Consequently, variations in strike of the formation are reflected by changes in strike of the veins. Veins of this group are seen on the surface and underground on the Snowshoe, Jim, and Midas properties, and on the surface at the Corban showings and the Stockwork.

The easterly striking veins occupy fractures striking from north 80 degrees east to south 75 degrees east. In some instances there is shearing along the walls of the vein. These easterly striking veins are narrow, from 1 to 3 feet in width, and in general are slightly longer than the northeasterly striking ones. Veins of this group may be seen on the surface and underground on the Jim and the Midas properties.

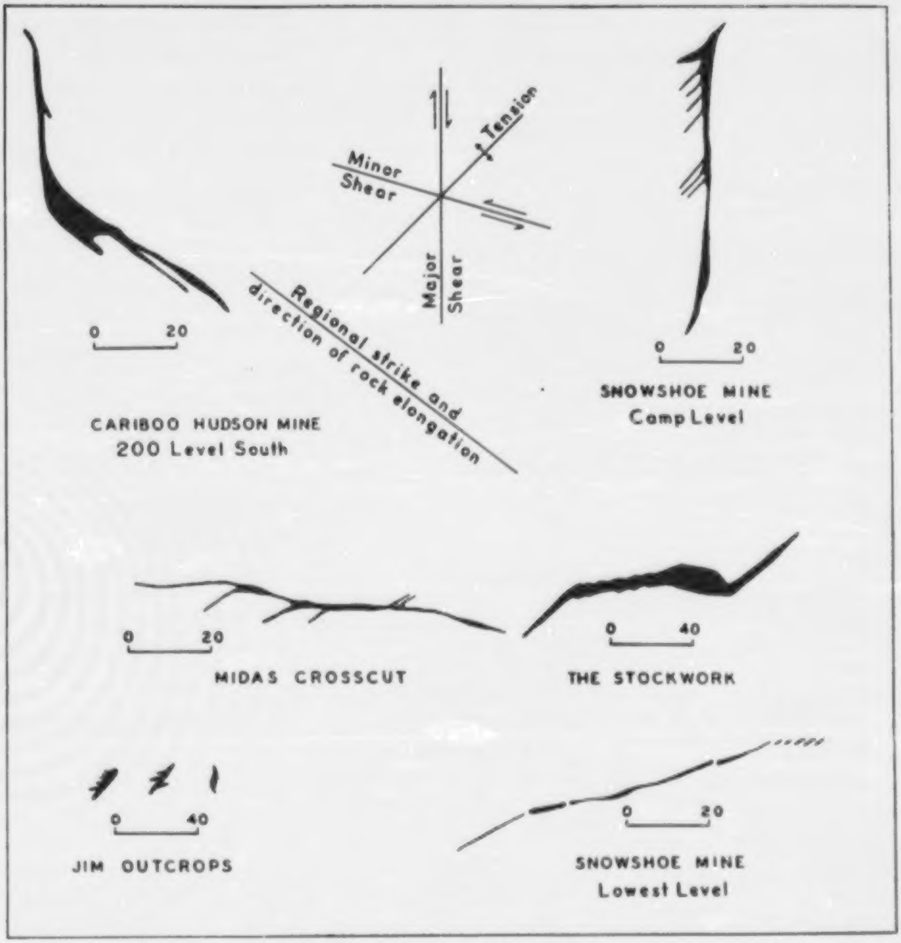
In some instances, veins do not occupy single fractures but form along two directions of fracturing, of which one or the other may dominate (*see* Fig. 6). The branching pattern thus produced is illustrated on the Camp and Intermediate levels of the Snowshoe mine by the main vein which has formed along a northerly striking fault and from which small strands branch off along northeasterly fractures; on the surface at the Jim mine by veins occupying both northeasterly and easterly striking fractures with either direction dominating; and in the Midas adit by veins occupying both northeasterly and easterly fractures, of which the easterly direction dominates.

The Cornish Ledges are northwesterly striking veins which cross the formational strike at a small angle. They strike north 55 degrees west, dip steeply to the northeast, and presumably occupy tension fractures. The veins reach 2 feet in width and have a maximum observed length of 125 feet.

The Plateau d'Or vein and a vein lying east of the Cornish Ledges are northwesterly striking veins that are parallel to the strike of the beds. They dip steeply northeastward, cut across the dip of both bedding and cleavage, and presumably occupy small strike-faults. These veins in local enlargements may swell to a width of 10 feet or more and are 250 feet and 400 feet long respectively.

VEIN MINERALIZATION

The vein quartz is generally massive or only slightly fractured and has a milky-white appearance. Small crystal-lined vugs occur in most vein quartz. At the Corban showings the vugs are exceptionally large and may be lined with quartz crystals 1 to 2 inches across.



Minor Shear
Tension
Major Shear
Regional strike and direction of rock elongation
0 20
CARIBOO HUDSON MINE
200 Level South
0 20
SNOWSHOE MINE
Camp Level
0 20
MIDAS CROSSCUT
0 40
THE STOCKWORK
0 40
JIM OUTCROPS
0 20
SNOWSHOE MINE
Lowest Level

Figure 6. Patterns of branching veins shown in relation to the major directions of fracturing.

Ankerite is an extremely common but not universal gangue mineral which for the most part appears as a selvage a quarter of an inch to an inch wide along the vein walls, or as disseminated grains within the vein. In some instances, narrow veinlets of ankerite extend from quartz veins into the wallrock. The variability in composition of the ankerite is shown by the chemical analyses in Appendix B (*see* p. 92). It is considered that the ankerite-bearing veins have been the source of at least part of the widespread ankerite in the country rocks (*see* p. 24).

With few exceptions, the quartz is extremely sparsely mineralized, the sulphide content of any vein rarely being more than 1 or 2 per cent. Pyrite is the most abundant of the vein sulphides and occurs in irregular masses and disseminated grains. In addition, some of the wallrock in the Yankee Belle adit and some of the rocks in the canyon on French Snowshoe Creek are pyritized. Assays indicate that the quantity of gold is closely related to the amount of pyrite in a vein and that, where visible gold is not present, the highest assays are obtained from samples containing the most pyrite.

Commonly the pyrite is leached from vein outcrops, and conditions of weathering have been such that the quartz may be completely free of iron stain. In other veins abundant limonitic residues and stains are present. Close observation should enable one to distinguish between the reddish-brown colour and rhombic cavities resulting from the weathering of ankerite and the yellow-brown colour and cubic forms derived from pyrite.

Galena and sphalerite may be present in the veins. Generally they are in small amounts as disseminated grains, although locally, as at the Cariboo Hudson and on the Sedan and Hibernian claims, small concentrations of galena and sphalerite may occur.

A vein discovered in 1951 on the Skarn claim north of the Copper Creek bridges is well mineralized with tetrahedrite. This mineral is commonly present in veins along Copper Creek but has not been observed elsewhere.

Scheelite is present in small amounts in many of the quartz veins, but significant amounts are present only at the Taylor Tungsten, in a vein near Snarlberg, at the Cariboo Hudson, and near the bridges across Copper Creek. Tungstite formed by alteration of scheelite occurs in small amounts at the Taylor Tungsten showing.

Visible gold is present in the outcrops of some veins, mostly as small rough pieces and flakes lodged in the cubical cavities from which pyrite grains have been leached. Some gold, particularly in the Lipsey and Saddle veins, is in unfractured and otherwise unmineralized quartz, but it is estimated that the amount of such free gold is small. Assays indicate that most gold is associated with pyrite. It only becomes visible when the pyrite is leached. As a consequence, little or no gold is visible in veins exposed in underground workings, whereas some was seen or has been reported from most vein outcrops.

ORIGIN OF THE VEIN FRACTURES

The veins for the most part are closely associated with northerly striking faults. Either they occupy the main fault or the fractures of two directions which may accompany it. The northerly striking faults are the dominant faults of the area, and fractures of two other directions were formed at the same time. Those fractures striking eastward are parallel to the complementary direction of shear (*see* Figs. 5 and 6 and p. 35), and those striking northeastward are essentially parallel to the associated direction of tension.

The northerly striking veins occupy faults along which, in some instances, there has been post-mineral movement. It has not been possible to determine the total displacement along the various faults, but some represent a considerable amount of movement. These northerly striking faults are comparable to ones of similar attitude which occur in all parts of the Cariboo and represent the last main structural event following the several periods of folding. No doubt both the mineralized and unmineralized faults were formed during the same structural episode. Their widespread distribution links them with regional structures, of which no further information is available within the area.

The northeasterly striking veins occupy tension fractures along which there has been no lateral movement. The fractures are almost at right angles to the elongation of the rock and are believed to have originated as extension (*ac*) joints (*see* p. 35). Later, right-hand movement along near-by northerly striking faults subjected the northeasterly fractures to tensional forces which tended to reopen them (*see* Fig. 5). In a few instances, zones of northeasterly veins are not known to be associated with any faults. Evidently such fractures were reopened by stresses that were not accompanied by fault movements.

The easterly striking veins are contemporaneous with those of the other two directions and are believed to occupy fractures formed by subordinate shearing stresses associated with the northerly striking faults. Right-hand movement along a northerly fault should be accompanied by left-hand movement along complementary easterly shears (*see* Fig. 5). All observations do not fully conform with this relationship because there appears to have been post-mineral movement along some easterly striking veins. The direction of this last movement is not constant, nor is it certain that it has been in the same direction as the pre-vein movement.

The Plateau d'Or vein and the vein east of the Cornish Ledges are two northwesterly striking veins, parallel to the strike of the rocks, that are believed to occupy strike-faults. There has been some post-mineral movement along the vein walls, but no indication was seen of the total amount of displacement along the faults. The Cornish Ledges are northwesterly veins occupying fractures which cut across the formation. They are regarded as tension fractures, inasmuch as there is no evidence of movement along them. The veins are in the lower Snowshoe quartzite immediately overlying the crest of a small anticline of Midas black silty quartzite which lies on the west side of a larger anticline of the same rock. Both the structural setting and the direction of fracturing are unique. The fractures could have been formed by left-hand movement parallel to the beds or along a northerly striking fault, but no evidence of either was observed.

DISTRIBUTION OF QUARTZ VEINS

The chief factors influencing the distribution of quartz veins have been structural. The position of northerly striking faults is the most important factor, because most veins either occupy such faults or occupy fractures that are directly related to them. Factors of lithology or rock type are important only in so far as the relative competencies of particular rocks in a structural setting may affect the nature and extent of the fracturing. Folding controls the distribution of rocks that locally may be favourable to vein formation, but the veins seem to bear no significant geometric relationship to any particular fold.

Quartz veins occur in the rocks of most of the formations, but they are more numerous in the Midas and Snowshoe formations than in others. The Cunningham limestone, although it was not studied as extensively as the other formations, appears to contain very few veins. The Yankee Belle formation near Yanks Peak contains the Corban and Talbot showings but near Roundtop Mountain is not known to contain any mineralized veins. The only known mineralized veins in the Yanks Peak quartzite are those at Sockett's showing on French Snowshoe Creek. In contrast, many veins are known in rocks of the Midas and Snowshoe formations.

Near Yanks Peak, Midas argillaceous schist contains the Lipsey and Saddle veins, the northeasterly and easterly veins at the Midas mine, and the northerly and northeasterly striking veins at the Snowshoe mine. The Midas black silty quartzite contains the Hebson, Imperial, Plateau d'Or, Pauline, and Betty veins, all of which are northerly striking, yet that member is not known to contain any northeasterly veins. Near Roundtop Mountain the only known mineralized veins in the Midas formation are the tungsten showings on the Skarn claim and the zinc replacement mineralization near the Bralco cabin.

Near Roundtop Mountain the veins are dominantly northerly striking and are in Snowshoe rocks, there being a general absence of veins in the Midas rocks. In contrast, many northerly striking veins as well as numerous northeasterly and easterly striking veins occur in both Midas and Snowshoe formations near Yanks Peak.

The Snowshoe formation contains the Stockwork, the Cornish Ledges, the Jim veins, the Taylor Tungsten showing, the Cariboo Hudson vein, numerous veins along Peter Gulch and Cunningham Creek, and numerous unmineralized quartz veins on the Snowshoe Plateau. No veins have been seen in the Snowshoe basal conglomerate.

The veins which actually occupy faults are the northerly striking Cariboo Hudson, Hebson, Imperial, Snowshoe, Lipsey, and Saddle veins.

The four veins at the Imperial, Snowshoe, Midas, and Sockett workings all occupy faults and all are more or less in line. Their alignment suggests that they lie along a single continuous fault, but there is no other evidence of one.

Veins which probably are associated with near-by northerly striking faults are the numerous northeasterly veins on the Snowshoe property, the Jim veins, and the Corban veins.

The position of veins in relation to the fold structures of the enclosing rocks is neither uniform nor particularly significant. The Cornish Ledges lie at the apex of a small anticline. The Hebson and Imperial veins are in anticlinal septa. The Snowshoe veins are in a minor anticlinal zone which may be a southeasterly extension of the same anticline that the Hebson vein occupies. The Corban veins are in an anticlinal region. The Jim showings and the Stockwork lie in a synclinal zone, and the Midas veins are in a flanking panel. The Cariboo Hudson and other veins along Peter Gulch lie along the east side of the Snowshoe syncline.

The old concept that veins near Yanks Peak are in some way related to the axis of an anticlinorium lying east of the Peak is without foundation, since it has been demonstrated that no such structure exists. The veins are not related to the axis of the Yankee Belle anticline which lies just west of Yanks Peak, nor to any other fold structure.

Formerly it was considered that the majority of auriferous veins in the vicinity of Roundtop Mountain lay within the middle Hudson member.* This simple stratigraphic relationship is no longer valid because the middle Hudson quartzite is now known to be part of the lower and middle Snowshoe members, which are far more widespread than are the known veins.

The main conclusions drawn from the distribution of veins are that:—

(*a*) Veins are localized mainly by structural rather than stratigraphic factors.

(*b*) Most veins occur along or are associated with northerly striking faults.

(*c*) Fold structures localize veins only in so far as they influence the position of a bed that fractured more readily.

AGE OF GOLD MINERALIZATION

The contemporaneity of formation of northerly, northeasterly, and easterly veins is evident from the relationships of northerly and northeasterly veins in the underground workings of the Snowshoe mine (*see* Fig. 6 and p. 82), and of northeasterly and easterly veins in surface workings on the Jim and in underground workings in the Midas adit. The introduction of vein quartz into all three sets of vein fractures must have been essentially contemporaneous and was later than the initiation of movement along the northerly striking faults.

The precise age of the faulting is not known, but for reasons set forth on page 37 it is considered to be post-Jurassic in age. The age, therefore, of the quartz and gold mineralization, which occupies fractures related to the major faults, cannot be pre-Mississippian but must be post-Jurassic.

The fact that elsewhere in the Cariboo auriferous quartz veins occur in the Quesnel River group of Jurassic age establishes the existence of a post-Jurassic gold-bearing mineralization. This evidence supports the belief that the quartz veins of the Yanks Peak-Roundtop Mountain area are post-Jurassic.

DISTRIBUTION OF GOLD

Within the veins themselves visible gold is seen in and around pyrite, or in cavities or cracks surrounding pockets from which pyrite has been leached. All assays indicate that gold is associated with pyrite rather than with the other vein minerals. Although high gold assays are invariably obtained from samples containing a large proportion of pyrite, the gold-pyrite ratio is not constant. Visible gold not associated with pyrite or other sulphides was seen only in the Lipsey and Saddle veins.

There is no satisfactory explanation for the variability of the gold-pyrite ratio, nor for the fact that some veins are mineralized with pyrite and others near by are not.

The prevalence of visible gold in the vein outcrops and its absence from veins in underground workings seems to be directly related to the leaching of the pyrite which allows the gold to be seen. Although some evidence might be so construed, there is no proof of a secondary origin of the visible gold.

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* *Geol. Surv., Canada*, Paper 38-16, p. 18.

Two main areas containing gold-bearing veins are indicated by the occurrence of auriferous veins near Yanks Peak in Midas rocks at the very head of Luce Creek, and near Roundtop Mountain in a band of lower and middle Snowshoe quartzites along the northeast side of the axial zone of the Snowshoe syncline. Erosion of veins in these two areas undoubtedly supplied gold that was concentrated in local placers at the head of Luce Creek and on Pearce Gulch and Peter Gulch.

The main concentrations of placer gold on Keithley Creek, the lower part of Little Snowshoe Creek, and on Cunningham Creek downstream from the head of Palmer Bench are not believed to have been derived from veins in the two known areas of vein outcrop. The distribution of gold in these three placers is interpreted as meaning that other areas are, or have been, underlain by gold-bearing veins. The Keithley Creek placer gold is thought to have had a bedrock source other than the known gold-bearing veins near Yanks Peak (*see* p. 56). Part of the placer on lower Little Snowshoe Creek may have been derived from veins at the head of the creek, but a large part is believed to have had its bedrock origin in veins closer to the placers (*see* p. 55). Small placer accumulations were worked on Pearce Gulch and on Peter Gulch downstream from the mouth of Crazy Creek, but the bulk of the placer gold mined from Cunningham Creek was downstream from the head of Palmer Bench. This main placer probably had its bedrock source closer than the known veins along Peter and Pearce Gulches. The known veins probably contributed gold to the two small placer accumulations in the gulches.

FINENESS AND SPECTROCHEMICAL ANALYSES OF GOLDS

When work was first started around Yanks Peak, samples of gold were obtained wherever possible from the outcrops of the various veins and from placer occurrences. The fineness of the gold in those samples was determined, and a spectrochemical analysis was made. It was hoped that some general relationships might be established between lode golds from different veins, and between lode gold and placer gold derived from the same bedrock source. The investigation was not completed because of difficulties in obtaining sufficient suitable gold samples, and also because of the erratic results from the preliminary work. The fineness results are tabulated in Appendix C and Appendix D (*see* pp. 93–97). Sufficient weight of sample to ensure a reasonable accuracy for the fineness determinations and to provide a sample for spectrochemical analysis was difficult to obtain. The precision of the fineness values is dependent upon the accuracy of weighing and is indicated in some instances.

On the Snowshoe property the fineness of gold from two surface exposures is 900 and 906, with an extreme range of from 879 to 920. The average fineness of gold from veins exposed underground, determined on gold beads obtained by smelting pyrite, is 915, with a range of from 902 to 933.

The fineness determinations on the Jim claim are on golds obtained from a single open-cut. The average fineness is 867 and the range is from 861 to 879.

The fineness of golds from four veins on the Midas property lies within a small bracket of variation. Gold from the Saddle vein averages 878 fine and ranges from 875 to 880; from the Tait vein, averages 884 fine and ranges from 868 to 891; from the Station 4 vein, averages 888 fine and ranges from 886 to 889; and from the Lipsey vein, averages 895 fine and ranges from 881 to 908.

Gold from the Corban vein averages 864 fine from two determinations of 841 and 887.

Placer gold from French Snowshoe Creek has an average fineness of 834 and ranges from 820 to 858. Gold from Keithley Creek averages 913 fine and ranges from 869 to 941. One fineness determination of gold from Little Snowshoe Creek is 888 and one of gold from Luce Creek is 818.

Reasons for significant differences in fineness of lode golds from the same vein or from different veins are not apparent from information available in the area. No explanation is apparent for the low fineness of placer gold from French Snowshoe Creek, nor for the high fineness of placer gold from Keithley Creek.

Difficulties were encountered with the spectrochemical analyses because the initial samples were small, and in only a few instances was sufficient gold available for a sample to be rerun. The significance of the presence or absence of some of the trace elements is not fully known.

The only consistent generalization is that all golds, both lode and placer, contain mercury and copper. The significance of the content of lead is not apparent, nor is that of titanium and chromium. Two rerun samples suggest that the titanium and chromium might vary widely. The placer gold from French Snowshoe Creek has significant amounts of chromium which cannot have been introduced by contamination.

The results of the spectrochemical work, although unsatisfactorily incomplete, are tabulated in Appendices C and D, pages 93 to 97.

PROSPECTING POSSIBILITIES

Prospectors and miners interested in both lode and placer have been in the Yanks Peak-Roundtop Mountain area since 1860. In so many years one might expect that every mineralized outcrop had been found and work had been done on all interesting showings. Yet on French Snowshoe Creek in 1946 J. Sockett and his brother made a discovery of hitherto unknown mineralization, and in 1951 Dan Jorgensen found a tetrahedrite-bearing vein near Copper Creek and Wilfred Thompson found a high-grade gold showing between Pearce Gulch and Peter Gulch.

Undoubtedly any future lode prospecting will be directed largely toward the discovery of veins in areas that are covered with overburden. In order to avoid more random searching than is necessary, this prospecting should be based on some sound geological plan. It has been shown that many of the quartz veins are associated with northerly striking faults and that right-hand fault movements tend to open pre-existing tension fractures. If this be generally true, there is good reason for believing that the Copper Creek fault should be closely prospected throughout its length. Furthermore, a northerly fault or fault zone such as may extend from the Imperial vein southward to French Snowshoe Creek should provide favourable prospecting. Several other faults have been mapped in the area south of Roundtop Mountain and may warrant close search.

Beyond the limits of the area the placer gold on Keithley Creek and on the lower stretch of Little Snowshoe Creek is believed to have been derived from a bedrock source close to the richest placer occurrences. The search for the sources of the placer gold on Keithley Creek undoubtedly has occupied the attention of numerous prospectors. Nevertheless, it is possible that the geological study of this area may provide some basic ideas that could be applied advantageously.

CHAPTER V.—PLACER-MINING

HISTORY

The early history of mining on Cunningham, Keithley, and Snowshoe Creeks is imperfectly known. Much first-hand information about Keithley and Snowshoe Creeks that could have been recorded some years ago from old-timers still living at that time was never obtained. An invaluable record of the past was lost in the destruction by fire of the old records and accounts kept by Robert Borland,[*] who first came to Keithley in 1862 and who died there in the winter of 1922. Most of the subsequent information has been obtained from material on file in the Provincial Archives and from various Annual Reports of the British Columbia Minister of Mines.

KEITHLEY CREEK AND TRIBUTARIES

Mining on Keithley and Snowshoe Creeks[†] in the early days was chiefly concerned with placering, although there was some quartz-mining activity for a short time after the discovery in 1862 of the Douglas vein on Luce Creek.

Placer gold was first found near the mouth of Keithley Creek in July, 1860, by W. R. (Doc) Keithley, who, in October of that year, recorded a claim on his discovery of placer gold on the Cariboo River (then called the North Fork of the Quesnel River) about 12 miles upstream from Quesnel Forks. In October, 1860, thirty to forty men were working on Keithley Creek,[‡] and George W. Weaver, William Haseltine, and four partners, calling themselves the Slide Company, were mining on their discovery claims just above Sebastopol Point. Placer gold was also found on Snowshoe Creek[§] in September, 1860. The tremendous new discoveries of placer on Antler, Cunningham, Williams, Lightning, and other creeks in 1861 and 1862 drew men away from Keithley Creek, and few claims were recorded there in those years. The early placer activity on Keithley Creek subsided rapidly, and was overshadowed by the discoveries on other creeks to the north. In 1866 the nine white men working on Keithley Creek were making $9 to $14 per day per hand, and all were intending to winter on the creek. In addition to them, it is reported[‖] that more than thirty Chinese miners were working on Keithley Creek, and that on Little Snowshoe Creek " there are three white men at work—each has a separate claim—one is a Fenian, another a ' Live Yankee ' [Wm. Luce], and the other a ' John Bull ' [Thos. Haywood[¶]]. The ' Live Yankee ' has every faith in his old quartz lead on Snowshoe [*sic*] and intends to resume work on it[**] as soon as he makes a little money."

On Keithley Creek in 1867 there were twenty-two white men (half of them mining and half prospecting) and sixteen Chinese, and on (Little) Snowshoe Creek there were twelve white men and twenty Chinese.[††] It is stated that the Grotto Company and a large Chinese company near Weaver Creek were the only companies in good pay ground.

In 1868 about four white companies and one or two Chinese companies were making good pay, about $10 to $20 per man per day, and three others were tunnelling.

In July, 1868, the Cariboo Sentinel reports that " the ' Live Yankee ' at the head of [Little] Snowshoe Creek is working Chinamen and paying about wages." On August 5th, 1868, the Cariboo Sentinel records that " ' Live Yankee ' and ' English Tom ' [Thos. Haywood] are at work on this [Little Snowshoe] Creek in opposite banks being not able to agree as to where they should work. These two worthies, so long partners, have separated and are each working on his own hook."

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[*] Much of the gold mined on Keithley, Snowshoe, and Harvey Creeks was bought by Veith & Borland's Store.

[†] In many accounts of the early days, references are made to Snowshoe Creek, but it is believed that they properly refer to what is now known as Little Snowshoe Creek.

[‡] It is recorded in a letter to the Colonial Secretary from P. H. Nind, the Gold Commissioner at Williams Lake, that from 100 to 150 men had been at work on the creek earlier in the autumn.

[§] Probably Little Snowshoe Creek, although the record states Snowshoe Creek.

[‖] Cariboo Sentinel, August 9th, 1866.

[¶] Haywood, according to Bowman (*Minister of Mines, B.C.*, Ann. Rept., 1886, p. 227), was an English-Australian sailor.

[**] Haywood worked an arrastre on quartz from this deposit, but the work was unprofitable (see *Minister of Mines, B.C.*, Ann. Rept., 1902, p. 92).

[††] Cariboo Sentinel, July 8th, 1867.

In 1869 about a dozen companies were working on Keithley Creek, while on (Little) Snowshoe “three companies have started to sink shafts—the ‘Live Yankee’ continues doing well and several other companies are prospecting[*].” Those prospecting were “Kimball and Robertson running a tunnel above ‘Live Yankee’s’ claim and Black Jack and Somers running a tunnel below.” In November, 1869, about sixty men were working during the winter on Keithley Creek.

Little or no news was reported from Keithley Creek in 1870. The Stonewall Company, which had been in some very rich ground the previous year (reported to have run in some places as high as 110 ounces to the drift set), closed down and abandoned its claims.

In 1871 things were very quiet on Keithley and Little Snowshoe Creeks. The Cariboo Sentinel, April 1st, 1871, reports that “nothing having been struck this winter, most of the miners have been seized with Peace River fever because of the discovery of placer on Vital, Germansen, Slate and Manson Creeks in the Omineca and very few men are now left on the creek.” The Cariboo Sentinel of June 17th, 1871, records “Keithley Creek has yielded from the first large amounts and there are still a few companies at work. Snowshoe Creek with all its various branches has never been much worked but there are a few old hands who remain there constantly and make money, how much it would be hard to say.”

On March 23rd, 1872, the Cariboo Sentinel reports that on Little Snowshoe Creek “Kansas John and Thos. Haywood have got bedrock in their shaft and will sink in it and open out preparatory to trying for deep ground.”

On September 12th, 1873, William Luce recorded 14.3 acres of land for mining purposes on the east branch of Little Snowshoe Creek, this was the Luce claim (Lot 3B, now cancelled) on what is now called Luce Creek.

In July, 1874, there were thirty-five white men and seventy Chinese working on Keithley Creek.

In July, 1874, the Rawley Company, consisting of J. Rawley, R. Borland, J. Adams, and G. Veith, recorded four claims extending upstream from the Newell Company at the mouth of Little Snowshoe Creek. From time to time the Rawley Company acquired more claims, until by 1878 it controlled 2,200 feet along the lower stretch of Little Snowshoe Creek. This company sank two shafts on the lower part of Little Snowshoe Creek[†] and drifted the deep channel of the creek. The lower Rawley shaft was 52 feet to bedrock. The rise in production of gold from Little Snowshoe Creek in 1879, 1880, and 1881, as shown in Table 1 on page 53, resulted largely from the production of the Rawley Company. The success of this company in mining the deep channel led to claims being located along the entire creek from the upper Rawley line upstream to the forks of the creek. The companies that located ground there between 1878 and 1880 were the Last Chance Company, recording immediately upstream from the Rawley Company; the Adams Company, which recorded 800 feet downstream from the forks on Little Snowshoe Creek; Naylor & Company, which recorded 1,200 feet upstream from Barr’s cabin on Little Snowshoe Creek; and Garfield & Company, which recorded 800 feet upstream from Haywood’s old bedrock drain tunnel.

After the Rawley Company abandoned its workings, James Strain in June, 1883, re-recorded all of the ground formerly held by Rawley Company claims. He did a small amount of surface work, but his main effort was to sink a shaft and to drift downstream. The downstream drift is said to have been in ground running 11 ounces to the set when work was stopped because of his inability to handle the water.

A renewed attempt to mine the deep ground at the mouth of Little Snowshoe Creek downstream from the old Rawley Company drift workings was made by the Golden Gate

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[*] Cariboo Sentinel, June 5th, 1869.

[†] Their positions are shown on Bowman’s map of Little Snowshoe and Keithley Creeks (*Geol. Surv., Canada*, Map 369, 1895).

Company, which in 1892 sank a shaft at great expense and drove into the deep ground at the mouth of the creek. It is recorded that although "at times very good prospects were met with the return has not proved satisfactory." *In 1901 and 1902 the Golden Gate* lease was held by George Veith, Robert Barr, and T. Sevewright, who worked that ground as well as some ground on the old Strain lease immediately upstream.[*]

William Luce ("Live Yankee" or "Old Yank") died on May 28th, 1881, and his claim, Lot 3B, on the east fork of Little Snowshoe Creek was acquired by Smith and Anderson. The ground that had been drifted by Luce was hydraulicked by them. They put in a hydraulic system, and short accounts in Annual Reports of 1887 and subsequent years indicate that hydraulicking began about 1888 and was continued by them until 1905, when W. F. Anderson, who was the foreman and principal owner, died. In 1906 the ground (the old Luce claim) was purchased by Graham and V. Minisci, who, each year with a crew of from seven to ten men, operated the hydraulic mine until 1913, when a slide took out part of the ditch. There is no record of hydraulicking having been done there since.

The Haywood placer claim, worked for many years previously by Thomas Haywood, was acquired by Veith and Borland, who in 1889 completed a new ditch and installed hydraulic equipment. Hydraulicking was begun by them in 1890 and continued on the Haywood claim until 1909. In 1932 it is recorded that J. W. Griffin and associates did some prospecting, but no hydraulicking was attempted.

There has been only sporadic placer-mining on Little Snowshoe Creek since the Haywood and Luce (Smith and Anderson, or Minisci) hydraulic mines were abandoned.

Cunningham Creek and Tributaries[†]

The discovery of placer gold on Cunningham Creek was made in 1860 by William Cunningham, but the first claims were not recorded until March, 1861, after the winter stampede to Antler Creek. There is little mention of work being done until 1864, when the discovery of rich shallow diggings was made, and many claims were recorded in August on ground lying downstream from Sharp's Bench. In 1865 about 300 men were working on these claims, and the small settlement that grew up near the discovery claim and about half a mile upstream from Jawbone Flat was called Lewistown, after one of the miners. The shallow ground was soon worked out, and by the end of that season the peak of activity had passed and only fifteen men remained.

In 1866 an attempt was made by the Alpha Company to reach bedrock below the deep ground about 3 miles downstream, near the creek bend at the junction of Cunningham Pass Creek, but the shaft was abandoned at a depth of 84 feet before bedrock was reached. In 1872 the Cunningham Company sank the shaft an additional 10 feet before abandoning it, and in 1876 and 1877 the Victoria Company completed the shaft to bedrock at a depth of 120 feet and did a considerable amount of work in the deep channel before abandoning it as unprofitable.

After 1866 the two main operations were a hydraulic at Sharp's Bench and the Standish Company hydraulic farther downstream. The latter ground was taken over in 1875 and operated by Chinese, and after 1923 was worked as the Trehouse Placer by Fred Tregillus and Joe House. Palmer Bench was ground-sluiced in 1875 and 1876.

The placer on Pearce Gulch was found in 1882 by S. Pearce and W. Bennett, who were outfitted by a grant from a government exploration fund. The ground is said to have paid "fair wages," and two companies recorded claims on the gulch. However, 1883 found Pearce down the Willow River on another prospecting trip, and there is no further record of placering on the creek. Latterly, the caretaker at the Cariboo Hudson mine worked along Pearce Gulch downstream from the Cariboo Hudson mill and recovered scheelite as well as a small amount of gold.

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[*] *Minister of Mines, B.C.*, Ann. Rept., 1902, p. 91.

[†] Placer-mining on Cunningham Creek is well described by W. A. Johnston in Geological Survey of Canada Memoir 149, pp. 72–80.

During the last few years a small hydraulic operation at the mouth of Crazy Creek has taken advantage of the spring high water, and there has been sporadic individual placering at the lower end of Sharp's Bench for some years past.

GENERAL DESCRIPTION OF PLACERS

Creeks in the Yanks Peak-Roundtop Mountain area are, with a few minor exceptions, tributary to Keithley Creek, Cunningham Creek, or Harvey Creek.

On Keithley Creek drainage, gold-bearing placers have been worked on Little Snowshoe Creek and its tributary Luce Creek, and on French Snowshoe Creek.

Continuous old placer diggings extend downstream on Luce Creek from the northeast corner of the Betty claim (Lot 11335). However, the main placer workings on Little Snowshoe Creek are downstream from the forks and for the most part west of the mapped area. The Haywood cabin, close to the western edge of the map, is near the head of the Haywood hydraulic pit and of placer ground which was worked for many years by Thomas Haywood. On his death it was acquired by Veith and Borland, who put in a new ditch and installed additional hydraulic equipment. They hydraulicked the ground from 1890 to 1909. It would appear that the ground was worked out because no work has been done since. A section of the old filled channel of Little Snowshoe Creek lying on the south side of the valley was mined by drifting and hydraulicking. The normal flow of the creek was disturbed by mining, and the creek now runs through the hydraulic pit on this old channel, while the trail down Little Snowshoe Creek, west of the Haywood cabin, follows the abandoned creek bed through a narrow rock canyon. The old channel of the creek evidently had sufficient gradient and was sufficiently high above the present creek to allow its being hydraulicked. Farther downstream the old channel lies below the grade of the present creek and was drifted from shafts sunk to bedrock. Downstream the shafts are progressively deeper to the mouth of Little Snowshoe Creek, where bedrock in the lower Rawley shaft is 52 feet deep.

Old, shallow, surface placer workings extend up Little Snowshoe Creek for about 3,000 feet above its junction with Luce Creek. In most places the diggings are not extensive, and they have the appearance more of prospecting work than of mining. Accordingly, it is inferred that the amount of gold recovered was not great.

The old Luce claim, Lot 3B, was on the east fork of Little Snowshoe Creek, now called Luce Creek. For many years William Luce drifted a buried side channel lying on the north side of the present creek. After his death in 1881 Smith and Anderson acquired the claim, installed hydraulic equipment, and began hydraulicking in 1888. After Anderson's death in 1905 the ground was purchased by Graham and Minisci, who continued hydraulicking until 1913, when a slide took out part of their ditch. The hydraulic pit is about 1,500 feet long and is shown on Sheet A of Figure 2. At its upstream end, bedrock in the bottom of the old channel is about 5 feet above the level of the present creek and is directly overlain by boulder clay. Extensive prospect trenches and pits east of the head of the pit show that all preglacial gravel has been completely removed by ice, that boulder clay everywhere lies on bedrock, and that the head of workable pay ground was reached. A small island-like remnant of boulder clay lies between the old hydraulic pit on the north and the rocky channel of the present Luce Creek, and on it can still be discerned the site of Luce's old cabin.

Both the Luce and Haywood workings are in remnants of the preglacial channel of Little Snowshoe Creek. It was largely this channel, whether it lay above or below present creek grade, that contained the placer accumulations so extensively worked by the old-timers. Near the head of the creek the channel lay at and above the grade of the present creek and was drifted or hydraulicked, but downstream from the Haywood pit it lay below creek grade and was drifted from shafts. The present creek contained gold only where the old channel had been eroded by the new. A few small placer workings along the creek were on bedrock bench remnants or in shallow postglacial gravels. Although these may have provided small, rich, easily worked concentrations of placer gold, the bulk of the gold is believed to have been mined from the preglacial channel.

Placer deposits on French Snowshoe Creek were not nearly so extensive as those on Little Snowshoe. Between the mouth of the creek and the foot of the canyon, bedrock lies at considerable depths below creek grade. For example, bedrock at the face of Jim Adams's Long Tunnel is 110 feet below surface, drill-holes on French Snowshoe Creek above the road crossing are 70 to 80 feet to bedrock, and shafts and drill-holes just below the foot of the canyon are 40 to 45 feet to bedrock. Nowhere in this distance of about 8,000 feet has bedrock in the creek bottom been drifted.

Bedrock is almost continuously exposed for about 5,500 feet through the canyon on French Snowshoe Creek. In the canyon there is very little evidence of old placer diggings, other than those of Pat McGovern* on a bedrock bench 10 to 20 feet above the creek level and about 600 feet upstream from the foot of the canyon.

Upstream from the head of the canyon, fairly extensive old placer diggings extend for about 2,700 feet to the mouth of Dutchman Creek. Some of this ground was worked by old-timers, and some more recently by Jack Larsen, whose cabin in the canyon is now owned by J. Sockett. About 500 feet below the mouth of Dutchman Creek, on the north side of French Snowshoe Creek, are fairly extensive ground sluice workings on a small rich spot found and worked by Tom Mitchell and later worked by Jack Walton and Tom Clark in the later 1920's. Small, shallow hand diggings extend along the creek upstream from Dutchman Creek to a point about 2,200 feet north of Calgary Dam at the mouth of a branch of French Snowshoe Creek 3,500 feet upstream from Snarlberg. In many of these old workings, boulder clay lies directly on bedrock and nearly all preglacial gravel appears to have been eroded. The amount of gold mined from this stretch of creek probably was small.

On Cunningham Creek drainage the main accumulation of placer gold was on Cunningham Creek downstream from Palmer Bench about 3,500 feet north of the mapped area. In this stretch of Cunningham Creek, gold-bearing placers were mined on Palmer Bench, Sharp's Bench, and the bench at Trehouse, all of which are only a short distance above creek level, and which probably are remnants of a once continuous bedrock level. Placer was also mined where Cunningham Creek had cut into the benches and reconcentrated gold in the bottom of the present creek below them. The placers on this stretch of Cunningham Creek are well described by Johnston in Geological Survey of Canada Memoir 149, pages 72 to 80.

There are no old placer diggings on the main Cunningham Creek between Palmer Bench and the junction of Peter Gulch, nor on Cunningham Creek upstream from the junction.

Within the area mapped, placer accumulations have been mined in two places—one on Pearce Gulch and the other on Peter Gulch.

The Pearce diggings on Pearce Gulch are shown on Bowman's map of Cunningham Creek,† but no details of their history are known. More recently, the caretaker at Cariboo Hudson mine, Charles Petersen, placered along the creek downstream from the mill and recovered a small amount of gold as well as a hundred or more pounds of placer scheelite.

On Peter Gulch, old placer diggings extend upstream for about 1,000 feet from the junction of Crazy Creek. Latterly, K. Martinson and P. Edberg, by taking advantage of the spring run-off of Copper Creek, have been hydraulicking a low bedrock bench on the north side of Peter Gulch at the junction of Crazy Creek. The gold from this operation is rough and must have been eroded from a bedrock source very close by. Similarly, the placer gold and scheelite on Pearce Gulch are presumed to come from the Cariboo Hudson vein or others near by.

The other tributaries, Roundtop, Lostway, and Nolaka Creeks, flowing northward into Cunningham Creek, are not known to have been mined for placer.

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* One story relates that McGovern recovered about 7,000 ounces of gold from the small area of his diggings, but there is no official record of that amount of gold having been mined at the time he worked.

† *Geol. Surv., Canada*, Map 368, 1895.

On Harvey Creek drainage the main accumulation of placer gold was downstream from the junction of Simlock and Harvey Creeks. There has been no placer-mining within the area mapped on the upper reaches of Harvey or Simlock Creeks. Of possible bearing on Harvey Creek placers is the fact that the southerly extension of the Simlock fault lies just east of the junction of Simlock and Harvey Creeks near a depression along which limestone beds appear to have been displaced.

PLACER PRODUCTION AND DISTRIBUTION OF PLACER GOLD

The Yanks Peak-Roundtop Mountain area lies at the heads of several important placer creeks whose recorded production of placer gold, set out in Table 1, is undoubtedly very much greater than the amount of gold actually mined within the mapped area. For the most part the richest stretches of the placer creeks lie beyond the area even though their headwaters lie within it. This is particularly true of Little Snowshoe, Cunningham, and Harvey Creeks.

The recorded amounts of placer gold produced since 1874 from Snowshoe, Little Snowshoe, and French Snowshoe Creeks, as well as Keithley, Harvey, Cunningham, and Barr Creeks, are shown in yearly detail in Table 1. A great deal of gold was mined between 1860, the year of discovery of placer gold on Keithley Creek, and 1874, the first year for which records are available, but there is absolutely no record of either the annual or total production of placer gold mined during that period. From 1874 to 1897 regular estimates of annual production were made by the Gold Commissioner in Barkerville, but from 1898 to 1921 returns of gold production were haphazardly recorded. Since 1922 a yearly estimate of the gold produced is available.

In Table 1 the average fineness of placer gold from Barr Creek is taken as 902, from French Snowshoe Creek as 834, from Keithley Creek as 897, from Little Snowshoe Creek as 888, from Snowshoe Creek as 888, from Harvey Creek as 901, and Cunningham Creek as 861. These fineness figures have been used to derive the factor which is used to convert the estimated dollar value of gold produced into weight in ounces of crude placer gold, or vice versa.*

In early days the creek now called Little Snowshoe Creek was generally known as Snowshoe Creek, and undoubtedly most of the gold recorded in Table 1 under Snowshoe Creek was actually mined on Little Snowshoe Creek. Snowshoe Creek, as presently defined, has few placer workings on it, other than those just above its junction with Keithley Creek. There can be little doubt that its production of gold was small in comparison with that of Little Snowshoe.

On Little Snowshoe Creek the shallow, readily found and easily worked placer ground was mined shortly after the discovery of gold on the creek in 1860. During the 1870's numerous working shafts were sunk and the deep bedrock channel of the lower part of the creek was drifted. The production peak from 1879 to 1884 was the result of the deep drifting by the Rawley and other companies on the lower creek.

Since 1897 the record of gold produced from Little Snowshoe Creek is very incomplete, and no record of the amount of gold mined by hydraulic at either Haywood's or Luce's old workings is available. Hydraulicking began there in 1888 and 1890, and it would appear that the combined annual production was between $6,000 and $8,000 for the first few years of operation.

There are no records of the gold produced from any single operation on the creek, nor of the total gold produced within the boundaries of the area mapped.

All placer gold from French Snowshoe Creek was mined above the foot of the canyon, and no part of the deeply buried bedrock below the canyon has been mined. Although the recorded information is most incomplete, every indication is that the total production of the creek is small in comparison with that of Little Snowshoe Creek.

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* For further details see *B.C. Dept. of Mines*, Bull. No. 28, 1950, pp. 11, 12, 21, 49.

Table 1.—Placer-gold Production, 1874–1950

Year	Keithley Creek		Snowshoe Creek[1] (Tributary of Keithley Creek)		Little Snowshoe Creek (Tributary of Snowshoe Creek)		French Snowshoe Creek (Tributary of Snowshoe Creek)		Barr Creek (Tributary of Snowshoe Creek)		Cunningham Creek		Harvey Creek	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
		$		$		$		$		$		$		$
1874	1,068	19,500									140	2,500		
1875	1,398	25,515	721	13,162										
1876														
1877	1,116	20,370[2]									504	9,000		
1878	3,123	57,000[2]					46	800			1,401	25,000	161	3,000
1879	1,808	33,000	1,371	25,025							347	6,200		
1880	1,058	19,000	2,416	44,100							543	9,700	214	4,000
1881	1,918	35,000	1,436	26,200							504	9,000	322	6,000
1882	1,420	25,920	948	17,300							723	12,900	375	7,000
1883	1,392	25,400	836	15,250							560	10,000	338	6,300
1884	1,067	19,475	675	12,320							336	6,000	241	4,500
1885	548	10,000	427	7,800							560	10,000	134	2,500
1886	466	8,500	356	6,500			86	1,500			364	6,500	322	6,000
1887	603	11,000	356	6,500			69	1,200			308	5,500	161	3,000
1888	493	9,000	425	7,750			40	700			168	3,000	134	2,500
1889	466	8,500	466	8,500			57	1,000			431	7,700	187	3,500
1890	493	9,000	438	8,000			43	750			168	3,000	161	3,000
1891	532	9,700	384	7,000			43	750			308	5,500	147	2,750
1892	537	9,800	375	6,850			26	450			364	6,500	241	4,500
1893	712	13,000	403	7,350									214	4,000
1894	616	11,250	455	8,300									161	3,000
1895	586	10,700	342	6,250							420	7,500	107	2,000
1896	747	13,633	312	5,694									134	2,500
1897	636	11,600	247	4,500										
1898														
1899														
1900														
1901					201	3,668					308	5,500		
1902					192	3,500								
1903														
1904														
1905	329	6,000[3]									1,401	25,000		
1906	1,380	25,185									560	10,000		
1907	365	6,661									224	4,000		
1908											112	2,000		
1909											168	3,000		
1910					100	1,825								

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[1] Most of the production recorded under Snowshoe Creek unquestionably was mined from what is now known as Little Snowshoe Creek.

[2] Production of all creeks in Keithley district.

[3] Dividends from Onward claim (see *Minister of Mines, B.C.*, Ann. Rept., 1905, p. 51).

Table 1.—Placer-gold Production, 1874–1950—Continued

Year	Keithley Creek		Snowshoe Creek[1] (Tributary of Keithley Creek)		Little Snowshoe Creek (Tributary of Snowshoe Creek)		French Snowshoe Creek (Tributary of Snowshoe Creek)		Barr Creek (Tributary of Snowshoe Creek)		Cunningham Creek		Harvey Creek	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
		$		$		$		$		$		$		$
1911					384	7,000					168	3,000		
1912	274	5,000			274	5,000								
1913														
1914														
1915														
1916														
1917														
1918	77	1,400												
1919	274	5,000									280	5,000		
1920											112	2,000		
1921											56	1,000		
1922	1,872	17,000												
1923	1,470	27,000									150	2,684		
1924	3,940	71,905									157	2,800		
1925	1,184	21,618									33	594		
1926	7	126									33	590		
1927											108	1,875		
1928											119	2,117		
1929	60	1,108									80	1,399		
1930	441	8,093	109	1,989							34	565		
1931	140	2,444	50	912							115	2,099		
1932	15	259	67	1,387							120	2,438	12	248
1933	39	984	125	3,150							127	3,064		
1934	399	11,840	111	3,374							49	1,332	38	1,186
1935	138	4,240	34	1,049					8	252	14	403		
1936	210	6,586	55	1,697					86	2,709	11	331	30	956
1937	213	6,601							30	945	22	632		
1938	96	3,017									12	362		
1939	231	7,074							5	163	14	450	12	382
1940	154	5,061							87	3,019	22	735		
1941	107	3,571							70	2,342	25	829	7	237
1942	200	6,810							81	2,673	28	928		
1943	40	1,357							46	1,596	7	230		
1944									25	831	39	1,231		
1945														
1946	27	895							8	265				
1947	7	220					3	89						
1948	7	220									14	420		
1949	23	750					2	61			16	500		
1950	20	685					7	224			6	190		
Totals	36,532	674,873	13,940	257,909	1,151	20,993	422	7,524	446	14,795	12,893	234,798	3,853	73,059

[1] Most of the production recorded under Snowshoe Creek unquestionably was mined from what is now known as Little Snowshoe Creek.
Grand total, 69,237 ounces with a value of $1,283,951.

The most productive placers in the district were on Keithley Creek, whose recorded production is $674,873. Its actual production must be considerably greater for several reasons, chief of which is that between 1860 and 1873 there is no knowledge of the value of the gold mined. Moreover, the estimates of later years may be low, for there was always gold mined of which there was no record, some having been mined by Chinese who seldom disclosed details of their production, and some having been mined and transported from the country without its having been handled by any bank, store, or express company. Finally, since 1897 there are some years for which no record of production has been kept, even though gold is known to have been mined.

There can be little doubt, therefore, that the total recorded placer production of the district, 69,237 ounces of crude gold valued at $1,283,951, is considerably less than the total gold mined. An estimate, based on an intimate knowledge of the district from 1862 to 1922, was made by the late Robert Borland, of Keithley Creek. The firm of Veith & Borland handled a large part of the gold produced in the area, and Borland had reason to believe that Keithley Creek and its tributaries had produced gold to the value of about $5,000,000.*

The initial discovery of placer gold on Cunningham Creek was made near Sharp's Bench, and the bulk of the placer production has been from the stretch of the creek extending downstream from the head of Palmer Bench. A separate record of the amount of gold from Peter Gulch and Pearce Gulch is not available, but in comparison with Cunningham Creek it is undoubtedly small.

No placer gold has been mined on Simlock Creek and little or none on Harvey Creek above the junction with Simlock. The placer-gold production of Harvey Creek, shown in Table 1, was mined from that stretch of creek lying downstream from the junction of Simlock and lies outside the area.

RELATION OF PLACER DEPOSITS TO BEDROCK GEOLOGY

Erosion of the gold-bearing quartz veins at the head of Luce Creek released gold which undoubtedly was the source of part of the placer gold on Luce and Little Snowshoe Creeks. Preglacial gravel at the very head of Luce Creek was eroded by glacial ice and the placer gold was dispersed, possibly to be reconcentrated by postglacial erosion at downstream points. Whether or not all placer gold in the placers on Little Snowshoe Creek had its bedrock source in the veins at the head of Luce Creek is unknown. Originally, it was hoped that fineness and spectrochemical analysis might provide some direct evidence bearing on this question, but the difficulty of obtaining samples of placer gold prevented sufficient analyses being made. It seems hardly likely that all placer gold at the mouth of Little Snowshoe Creek could have migrated the 3½ to 4 miles downstream from the only known auriferous veins, those lying at the head of Luce Creek. If this were so, the richness of the placers and the coarseness of the gold should increase as the source is approached. There is no evidence to indicate that the upstream placers were the richer, and actually the reverse seems to have been the case. As a consequence, it is assumed that some placer gold on the lower stretch of Little Snowshoe Creek was derived from bedrock veins closer than those at the head of the creek.

On Little Snowshoe Creek no information is available regarding the distribution of placer gold to suggest that the source of the placer gold lies in a particular rock formation.

The small number of placer workings on Little Snowshoe Creek upstream from its junction with Luce Creek indicate that little of the downstream placer gold could have had its source there, and that less gold was released from veins at the head of Little Snowshoe than from Luce Creek. Moreover, one infers that the veins were neither so numerous nor so rich.

On French Snowshoe Creek so few details are available regarding the occurrence and value of the old placers that little indication is given of the bedrock source of the gold. Most placer-mining was done above the canyon in workings underlain by dark

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* *Mining and Engineering Record*, Vancouver, B.C., Vol. XXVIII, No. 1, 1923, p. 44.

Midas rocks, but there is no further indication that the placer gold was derived from the erosion of veins within the Midas formation.

On Keithley Creek the placer deposits extended from the mouth of the creek upstream for 5 miles to a point above the junction of Snowshoe Creek. Some gold was mined on Snowshoe Creek above its mouth, but the distribution of placers does not indicate that the gold migrated downstream from a source either on Little Snowshoe or French Snowshoe Creeks and then down Snowshoe Creek to be concentrated in the placers on Keithley Creek. Even though no bedrock veins are known, it is believed that the placer gold on Keithley Creek had its source close by. If the source were in quartz veins localized by northerly striking faults, the northerly extensions of such faults would cross the lower part of Little Snowshoe Creek and might serve to localize veins there. This conjecture has no supporting evidence but could serve as a working hypothesis for prospecting.

The two small placer occurrences on Peter Gulch and on Pearce Gulch are on Snowshoe formation rocks and probably represent local concentrations of gold from near-by bedrock sources. The main concentration of placer gold on Cunningham Creek coincided very closely with the crossing of a wide belt of Midas rocks, and there is no indication that the placer gold migrated downstream from a bedrock source close to the head of the creek. Despite the fact that no veins are currently known, a near-by bedrock source is assumed. It might be assumed further that the veins were localized by a northerly striking fault, even though bedrock mapping has revealed none.

The placer accumulation on Harvey Creek lies beyond the limits of bedrock mapping. The only information available is that it lies close to the southerly extension of the Simlock fault.

Placer-mining within the area has come to a standstill, except for a small exploratory operation at the foot of the canyon on French Snowshoe Creek and a small hydraulic at the mouth of Crazy Creek. Apparently little unworked placer ground remains. It is believed that the best that placer prospecting could hope to find would be small unworked remnants that would be suitable only for individual sniping or small-scale operation.

DESCRIPTION OF PLACER PROPERTIES

Cariboo Keithley Gold Placers

Until January, 1952, the Cariboo Keithley Gold Placers held three placer leases on French Snowshoe Creek extending upstream from the bridge across the creek to a point about 1,000 feet upstream from the foot of the rock canyon. From 1945 to 1950, with K. C. F. Monckton, of Vancouver, in charge of operations, this company worked on its leases below the foot of the canyon.

Upstream from the foot of the canyon, bedrock is exposed in the creek bottom. Downstream the creek is flowing on fill in the bottom of the valley. Old shafts about 1,500 feet below the foot of the canyon indicate that the depth to bedrock is 43 feet below creek level. Farther downstream some drilling, done by the company in 1945, indicates that 2,000 feet above the bridge the bedrock lies at a depth of about 65 feet. Downstream to the junction with Snowshoe Creek, bedrock is at progressively greater depths. Bedrock gravel below creek level in this section of French Snowshoe Creek has never been mined.

In the past a small amount of mining has been done on gravel lying on bedrock on the rims above creek level. From 1946 to 1950 the company has been hydraulicking on the south bank of the creek in several small pits below the foot of the canyon. Water for the work is supplied by a small creek. It is delivered under a head of about 215 feet to a small monitor which uses 1- to 2-inch nozzles.

In 1950 a double-drum hoist operating a dragline bucket was delivering gravel to a washing unit. Water for washing the gravel was supplied by a 5-inch centrifugal pump to a small monitor which washed the gravel from the dragline bucket through a grizzly into a short string of sluice-boxes.

CHAPTER VI.—DESCRIPTIONS OF LODE PROPERTIES

NOTE.—All surveyed claims are designated by lot number on Figure 2 and the accompanying detailed maps. In Appendix A, pages 90 and 91, the lot numbers on sheets A and B of Figure 2 are listed numerically with their corresponding claim names.

The positions of mineral occurrences are designated by numbers on sheets A and B of Figure 2. These numbers appear in the headings of the following property descriptions.

Cariboo-Hudson Gold Mines (1946) Limited
[5, 6]

The Cariboo-Hudson property consists of the Cunningham, Cutler, Hudson, and Black Martin groups of Crown-granted claims, and the Moneta group of five recorded claims, all owned by Cariboo-Hudson Gold Mines (1946) Limited. The property forms a block extending south from Copper Creek to the head of Simlock Creek. The camp is on the north side of Pearce Gulch, 18 miles by road from Barkerville. From the portal of the main adit, the 200 level, on the Hudson claim (Lot 9816) a crosscut runs through the ridge to the Simlock Creek side, where the east portal is on the Shasta No. 2 claim (Lot 9821). The portal of the 600 level is on the Fourth of July claim (Lot 9818).

The first claims, the Hudson (Lot 9816), Glen Echo (Lot 9817), First of July (Lot 9819), and the Fourth of July, were located in 1922 by I. E. Moore. These and the two Shasta claims (Lots 9820 and 9821), located in 1926, constituted the original Hudson group. These claims were acquired by Cariboo Amalgamated Gold Mines Limited and subsequently were transferred to Cariboo-Hudson Gold Mines Limited when that company was incorporated in 1936. This original company developed the mine, built a 100-ton cyanide mill, and mined 12,938 tons of ore, from which 5,186 fine ounces of gold was recovered before operations were discontinued in 1939. In 1940 about 19,000 lineal feet of bulldozer stripping was done on the Hudson (Lot 9816), Glen Echo (Lot 9817), and Shasta (Lots 9820 and 9821) claims under the direction of A. M. Richmond. The present company, formed in 1946 to acquire the holdings of Cariboo-Hudson Gold Mines Limited, did some underground work and surface and underground diamond drilling in 1946 and 1947, first under the direction of E. E. Mason and later under C. E. Gordon Brown and Colin H. Macdonald. Work was done in 1952 and 1953 on the scheelite showing on Peter Gulch by J. W. Wylie under the direction of R. R. Rose.

Cariboo-Hudson Mine [6].—The original surface showings at the Cariboo-Hudson are described by A. H. Lang, Geological Survey of Canada, Preliminary Paper 38-16, pages 27 to 29, and by D. Lay, British Columbia Minister of Mines Annual Report, 1929, page 191.

The mine is developed by a total of about 8,000 feet of drifting and crosscutting on five levels connected by a winze. Most development work has been done on the 200 and 600 levels, which constitute 3,800 feet and 3,700 feet of workings, respectively. Other drifting includes 350 feet on the 250 sublevel, 800 feet on the 300 level, and 300 feet on the 400 level. Most of the underground work was done to explore the Hudson shear below the 200 level.

The 200 level adit, the main entry to the mine, was started in 1937 and was driven from Pearce Gulch through the mountain to the Simlock Creek side, a distance of 1,580 feet. In 1938 the winze was sunk, the 250 and 300 level workings were started, and the 600 level was driven from the Simlock Creek side. From it, in 1939, a raise connection was made to the bottom of the winze on the 300 level.

The mine lies mostly in lower and middle Snowshoe rocks on the northeast side of the axial zone of the Snowshoe syncline. The rocks encountered underground are dominantly medium-grey fissile to flaggy quartzite or quartz sericite schist, a few black argillaceous beds, sericite schist, and chlorite schist. The green chlorite schist appears mainly near the south end of the 200 level and on the 250 level. It is presumably part of the upper member of the Snowshoe formation.

The fold structures in the rocks underground are extremely complex, and the intricacies would be revealed only by detailed mapping of the mine workings. An anticline is indicated by dragfolds in the crosscut northwest of the Hudson vein and in the main crosscut west of the Hudson vein. In the drift running south and more or less parallel to the Hudson vein, another anticline is indicated by dragfolds in some thin chert-like beds. It is apparent from a short examination that many of the beds are dragfolded and that there are many repetitions of beds. The over-all pattern of folding is not definitely known, except that it is isoclinal and repetitive. Nevertheless, there is some indication that the blocky quartzite in the walls of the shear adjacent to the Hudson orebody lies near the axial region of a minor anticline. Throughout the mine the regional plunge of dragfolds is to the northwest at angles ranging between 8 and 20 degrees.

The rocks are crossed by a series of northerly striking shears, some of which are mineralized, and by gently dipping northwesterly striking thrust faults of small displacement. The Hudson vein lies in one of the northerly shears.

The main adit crosscut is driven south 83 degrees east, and 280 feet from the portal crosses the Hudson vein at a point where it is 6 feet wide. The vein occupies the Hudson shear, which strikes about north 6 degrees east and is vertical or dips about 80 degrees east. It cuts across the formations which strike north 30 to 60 degrees west and dip 50 to 75 degrees northeast. The Hudson shear is a comparatively small break with branches running off along the bedding planes on both hangingwall and footwall sides. It appears to have a right-hand horizontal separation of about 15 feet. In some places small crumples along the walls indicate a later, small left-hand movement. Striations on the walls plunge at low angles to the north.

The Hudson shear contained a single orebody that outcropped on surface, was as much as 9 feet wide, and in some places contained high gold values. The orebody had a stope length on the 200 level of 195 feet, and on the 250 level of 185 feet. No ore was mined below the 250 level, but the vein was mined from the 250 level to the surface 95 to 110 feet above the 200 level. At the south end on the 200 level the orebody terminates abruptly at a point where numerous narrow quartz stringers branch from it and run parallel to the beds. At the north end the vein swings away from the Hudson shear along the foliation planes of the quartzite. The vein was followed for a considerable distance on the footwall side of the shear, but no additional ore was found. An extensive search for ore below the 250 level was made prior to 1940. The Hudson shear was explored by 800 feet of drifting on the 300 level, by 300 feet of drifting on the 400 level, and by 250 feet of drifting on the 600 level, but no additional ore was found.

Several northerly shears approximately parallel to the Hudson shear lie east and west of it. To the west, on the footwall side, the Shasta shear was explored on the 200 level to the south and found to contain no ore. Seventy-five feet east, on the hangingwall side, is a fault marked by a broken zone 10 to 12 feet wide dipping 55 to 70 degrees east and containing no ore. Three hundred and sixty feet east the 605 shear was followed by a drift for 150 feet on the 200 level. It is occupied by quartz, and the average of company sampling at regular intervals, including four gold assays higher than 0.50 ounce of gold per ton, is about 0.25 ounce of gold per ton.

The veins are cut by a series of gently dipping thrust faults striking about north 60 degrees west and dipping 15 to 40 degrees northeastward. Judged by the amount of gouge, it appears that only one fault represents an important displacement. On the others the movement appears to have been only a few feet.

The reasons for the localization of the Hudson orebody are not known. It is probable that the blocky quartzite observed on the 200 level is a repetition by isoclinal folding of a single, fairly thin sequence of beds which, within the axial region of an anticline, is sufficiently thickened by repetition to act as a competent rock unit. If the fracturing of such rock were more favourable for quartz mineralization, then the non-persistence of the Hudson orebody at depth could be attributed either to vagaries of the folding or to passage from quartzite in the axial region of the anticline into other less competent rock.

In 1946 it was assumed that ore was localized where the Hudson shear crosses blocky quartzite beds in a situation where the dips were somewhat flatter than usual. These dips of 40 to 55 degrees may be seen on the east side of the oreshoot on the 200 level and were assumed to represent a flexure plunging about 20 degrees north. A diamond-drilling programme based on the hypothesis that the flexure was the controlling structure was directed toward exploring parallel shears where they would intersect the northward plunging flexure. Ten holes were drilled from surface and fifteen from the 200 level without encouraging results.

The last work undertaken in 1947 consisted of driving a drift on the 600 level along a shear which lies about 50 feet west of the Hudson shear on the footwall side. In this 635 drift, which is about 60 feet in length, a 55-foot length of quartz is mineralized with pyrite, galena, sphalerite, and bright orange scheelite. The average of eleven samples taken at 5-foot intervals across an average sampled width of 4 feet is: Gold, 0.03 oz. per ton; silver, *nil;* tungstic oxide, 0.14 per cent.

Peter Gulch Scheelite Showings [*5*].—In the summer of 1942 scheelite was discovered by J. S. Stevenson, of the British Columbia Department of Mines, on the Cunningham No. 1 (Lot 5905) and the Cutler No. 1 (Lot 10596) claims. The main scheelite showing is on the west bank of Peter Gulch about 4,000 feet northwest of the mine. Near the showings the sides of the valley are steep, heavily wooded, and drift-covered.

The rocks are mainly quartz sericite schists, silvery grey where unweathered and, because of disseminated ankerite, buff coloured where weathered. Some of the schist is limy, and limestone outcrops near by at the junction of Pearce Gulch and Peter Gulch. The rocks are interfolded middle and upper Snowshoe members very close to the axial zone of the Snowshoe syncline.

The following description of the showing is quoted from Stevenson's report in British Columbia Department of Mines Bulletin No. 10 (Revised), 1943, pages 93 to 95:—

> Scheelite occurs in surface outcrops that have been exposed and cleared by ground sluicing and in a short adit below these outcrops. The present exposures disclose several mineralized lenses which occur at several places along a zone that ranges from 2 to 25 feet wide over a length of 210 feet. The present workings show that the scheelite has a vertical extent of at least 25 feet within this zone.
>
> The workings consist of a stripping approximately 60 square feet in area and a short adit below this stripping.
>
> A small stripping has been made on a scheelite-bearing lens on the opposite side of the creek from the adit and 170 feet upstream.
>
> In the main stripping the scheelite occurs as scattered patches of mineral in five quartz-ankerite lenses. These lenses range from a few inches to 18 inches in width and from 2 to 15 feet in length. They are in part bedded with the schist and in part constitute east-west diagonal lenses cutting the schist. Overburden covers the extension of some of the lenses. The lenses are separated across the width and along the length of the zone by barren schist.
>
> The minerals in the lenses include the following, listed in order of abundance: ankeritic carbonate, vein-quartz, scheelite and galena. Much of the quartz is fine-grained and intimately intergrown with both the ankerite and the scheelite. The scheelite areas range from 3 by 6 inches to walnut-size. The smaller areas usually are intricately replaced by quartz. Galena occurs as only a few small grains and is rarely in contact with scheelite.
>
> In the adit, the scheelite occurs as nodules which lie within an 8-foot shear-zone in the schist. However, the scheelite is confined to a 40-inch width in the hanging-wall of the zone, and from 1-inch to 4-inch lenses of barren quartz lie in the remaining width. The scheelite occurs as nodules or lenses of the pure mineral within the sheared schist and is not associated with any other mineral. It is most abundant on the south-easterly wall of the crosscut, becomes less abundant across the back and is in only small amounts on the north-westerly wall. However, the shear-zone continues north-westerly and the scheelite may also occur in this direction.
>
> Scheelite also occurs in a small stripping on the east side of the creek approximately 150 feet south-easterly from the main stripping. This small stripping exposes a scheelite-bearing lens of quartz and carbonate 10 inches wide in a vertical face. Because of the overburden, nothing is

> known of the extent of this lens. However, it lies along the south-easterly extension of the strike of the mineralized lenses of the main stripping and probably belongs to the same general zone.
>
> Fifteen channel samples, each ½-inch deep and 3 inches wide, were taken across the scheelite-bearing lenses. The locations, widths, and assay results of these samples are shown in Figure 5 [of Bull. 10].

No further work was done on the showing until the spring of 1952, when the present company let a contract to drive 200 feet of drift along the zone to the northwest.

The scheelite-bearing zone was followed from the point where it was first exposed in the adit for about 60 feet northwest. There the zone was crossed by a fault striking about north 10 degrees west and dipping 75 degrees west which offsets the zone 30 feet to the right. The zone was followed for about 30 feet on the west side of the fault. When the working was examined, the drift was caved at the fault and inaccessible beyond that point.

Scheelite was observed on examination under ultra-violet light for the 60 feet between the crosscut and the fault. The first 30 feet of mineralization is the best and was estimated to contain about 2.5 per cent tungstic oxide across an average width of 2½ feet.

In the summer of 1952 the bank along the east side of Peter Gulch was ground-sluiced for 300 feet upstream from the adit. Bedrock was laid bare and the southeastern extension of the scheelite-bearing zone was exposed. Scheelite is erratically distributed across a 10-foot width in narrow quartz veinlets and in narrow limestone beds. Several small northerly striking faults offset the zone in the stripped area.

In September camp buildings were moved from the old Cariboo-Hudson camp down to the junction of Pearce Gulch and Peter Gulch. A portal site was prepared about 300 feet southeast of the old adit, and a drift southeastward along the zone was begun. Difficulties were experienced in following the scheelite mineralization because of the lack of any continuous structure to follow. The drift had been driven 420 feet by May, 1953, when all work stopped.

In the autumn of 1951 several hundred feet of stripping done on the Moneta No. 3 claim near the southwest corner of the Cutler No. 1 (Lot 10596) disclosed a 5-foot width of gossan at a depth of 3½ feet. A sample taken at random across this width by an examining engineer assayed: Gold, 3.0 oz. per ton. This showing was not seen when the stripping was examined in 1952. At a point about 250 feet south of the southwest corner of the Cutler No. 1 a northerly striking fault terminates upper Snowshoe limestone beds, and the drag of the beds along the fault indicates a right-hand displacement. This fault is interpreted as being a strand of the Copper Creek fault, whose existence had been postulated earlier (*see* p. 34). The high gold assay takes on added significance because of its proximity to the fault.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1925, p. 150; 1945, pp. 115–117. *B.C. Dept. of Mines*, Bull. No. 10 (Rev.), 1943, pp. 93–96. *Geol. Surv., Canada*, Paper 36-15, p. 17; Paper 38-16, pp. 27–31.]

Cornish Ledges
[12]

The Cornish Ledges are on the Scott No. 5 claim, one of a group of claims held by Sam Allison, of Cache Creek, and H. Matte and N. Scott, of Wells. The veins outcrop at an elevation of 6,000 feet on a gentle slope that falls off eastward into the divide area between the heads of French Snowshoe Creek and a branch of Cunningham Creek. The veins are about 6,000 feet north of the Jim adit.

The story is related that these veins were worked in the very early days by a group of Cornish miners who mortared gold from the outcrops. Actually, work appears to have been done on only one vein. The old working consists of an opening about 25 feet in length and possibly averaging 3 feet in depth.

The Cornish Ledges consist of five main veins and two smaller veins outcropping in an area about 200 feet wide and 300 feet long (*see* Fig. 7). The veins are in grey coarse quartzite and grit of the lower Snowshoe member. These rocks strike about north

30 degrees west and dip 30 to 40 degrees northeast, forming a thin shell over a northwesterly plunging anticlinal septum of Midas black silty quartzite which outcrops in a small area to the southeast.

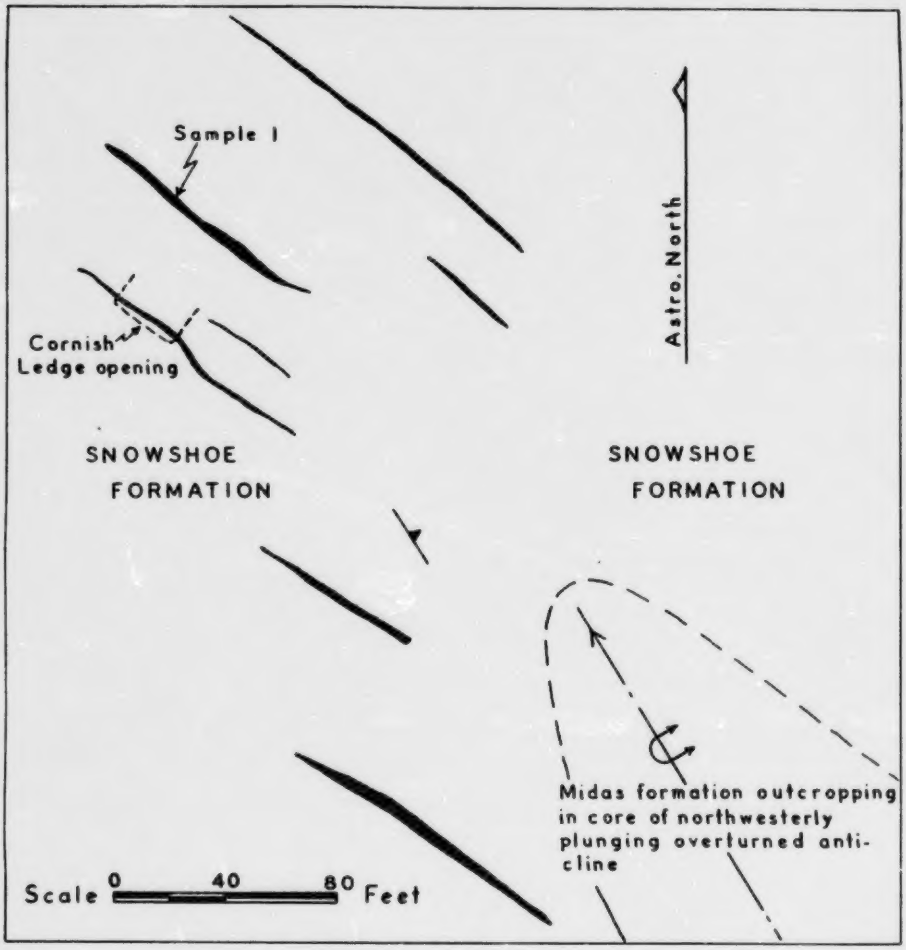
Sample I
Cornish Ledge opening
Astro. North
SNOWSHOE FORMATION
SNOWSHOE FORMATION
Midas formation outcropping in core of northwesterly plunging overturned anticline
Scale 0 40 80 Feet

Figure 7. The Cornish Ledges.

The veins strike north 50 to 60 degrees west, one dips 80 to 85 degrees southwest, and all the others except one dip 80 degrees northeast. This one, on which the Cornish Ledge opening was made, dips 80 degrees northeast at its southeast end and 70 degrees southwest at its northwest end. The veins cut across both the strike and dip of the beds and occupy a set of fractures differing in strike from any that have been observed elsewhere.

The veins have a maximum width of 4 feet and a greatest exposed length of 130 feet. The quartz for the most part is massive and unfractured, although the free walls of the Cornish Ledge indicate a small amount of right-hand post-mineral movement.

The quartz is very sparsely mineralized with galena and pyrite; galena appears to be the more abundant. Although gold is said to have been mortared out by Cornish miners, no visible gold was seen, nor has any been reported in recent times.

A selected sample of quartz (No. 1 on Fig. 7) containing about 50 per cent galena and some pyrite assayed: Gold, 0.01 oz. per ton; silver, 14.2 oz. per ton.

Vein quartz is exposed in a series of open-cuts about 400 feet north of the Cornish Ledges. Seven open-cuts expose quartz in a length of 400 feet. Continuity of the quartz between individual exposures is not definitely established, but the presence of a vein striking about north 25 degrees west is probable. The vein appears to lie along the contact of Snowshoe grits and quartzites on the southwest and Midas black silty quartzite on the northeast and to cut steeply across the dip of the beds, but this relationship is not definitely established. The vein reaches a maximum width of 14 feet in one open-cut and in five others is 6 to 10 feet wide. The quartz is sparsely mineralized with pyrite and galena. In one open-cut some lacy-textured marcasite is present, and from this cut a selected sample of pyrite and marcasite assayed: Gold, *nil*.

Until the autumn of 1951 Sam Allison and his partners, Henry Matte and N. Scott, held four groups (the Allison, Matte, Scott, and Louvelette groups), totalling twenty-five recorded claims lying to the north of the Cornish Ledges. Most of the claims are outside the limits of the area mapped. A brief examination of some of the veins on them, made in the company of Sam Allison, indicated that bands of Midas and Snowshoe rocks which were mapped to the south extend northwestward across the claims. Most veins appear to be in Snowshoe quartzites.

The veins appear to fall into two groups, including those striking from north 50 to 70 degrees east, and those striking east to south 60 degrees east. All are more or less vertical. The quartz is mineralized with pyrite or galena, or both. In no instance is the amount of sulphide mineralization very large, and for the most part it is considerably less than 5 per cent.

[Reference: *Geol. Surv., Canada*, Paper 38-16, p. 34.]

Hebson Vein
[10]

The Hebson vein is on the west side of the crest of the Aster-Breakneck Ridge, about 1,100 feet west of Aster B. It outcrops for about 500 feet at about 6,000 feet elevation on the gently sloping upland and extends southward downhill into Little Snowshoe Creek for about 1,000 feet. The total length of vein in natural exposures and open-cuts is about 1,600 feet. The vein is on the Hebson group, which is held by B. E. Taylor, of Wells, and was first located by him in 1931. The ground had been previously located about 1925 by F. M. Wells and before that by Hebson, after whom the vein was named, and who, in 1914, drove an exploratory adit on the vein. Undoubtedly the bold quartz outcrop was seen by the earliest prospectors in the country (*see* p. 39).

The vein is in Midas black silty quartzite which outcrops in a long narrow ribbon about 300 feet wide. These Midas rocks are folded into a thin anticlinal septum lying between synclines of grey Snowshoe quartzite to east and west.

The vein reaches a maximum of 25 feet wide near its northern end, in other exposures ranges between 4 and 15 feet wide, and in the southern open-cuts averages about 10 feet wide. It strikes about north 5 degrees west and cuts across the foliation of the enclosing rocks. The vein appears to dip 65 degrees east in the Hebson adit, and lower down, in the Taylor adit, it dips 75 degrees east. The vein is ribboned with slivers of unreplaced wallrock and has 2 to 3 inches of gouge along the hangingwall side. At the Hebson adit there is brecciated and recemented quartz along the walls. The vein occupies a northerly striking fault along which some of the movement was later than the introduction of the vein quartz.

The vein is very sparsely mineralized with pyrite. For the most part the quartz is iron-stained, and no mineralization is to be seen in it. Taylor states that very fine gold may be panned from several of the vein outcrops and that the highest assay he obtained was about 0.35 ounce gold per ton.

The Hebson adit is at an elevation of about 5,760 feet and is inaccessible. It is said to be about 70 feet long and to have been driven along the west side of a 6- to 8-foot vein which angles across the adit and which at the face is about 12 feet wide. Some high gold assays are reported to have been obtained about 30 feet from the portal.

The Taylor adit, at an elevation of about 5,560 feet, was driven by B. E. Taylor from the side of a small tributary of Little Snowshoe Creek. The adit crosscuts the formation for about 150 feet and at the face exposes the full vein width of 9 feet. The quartz is crushed and ribboned and slightly iron-stained, but no mineralization is evident. A sample assayed: Gold, *nil*. Several open-cuts and short timbered drifts in overburden have traced the vein for several hundred feet south of the Taylor adit.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1912, p. 54; 1934, p. C 31. *Geol. Surv., Canada*, Paper 38-16, pp. 32, 33.]

Hibernian
[1]

The Hibernian mineral claim, held by August Buschmann, of Seattle, is at the junction of Peter Gulch and Cunningham Creek. It is underlain by lower and middle Snowshoe quartzite. The claim has been prospected by a series of ground-sluice cuts, one of which exposes an 18-inch northerly striking vein, well mineralized with galena and arsenopyrite. A selected, well-mineralized piece of quartz assayed: Gold, 0.76 oz. per ton.

Holmes Ledge
[8]

The Holmes Ledge is at about 5,600 feet elevation in Holmes Basin, about 800 feet slightly north of west from Aster A. It is in a sliver of Midas black silty quartzite in the core of a minor anticline that is hooded by Snowshoe grey quartzite and grit. The rocks exposed along the southern and eastern rims of Holmes Basin are members of the Snowshoe formation and range from coarse basal conglomerate through to the upper limestone beds.

The old-timers' work is an open-cut about 35 feet long on a vein striking north 80 degrees east and dipping 75 degrees south. The vein is from 2 to 3 feet wide in the bottom of the open-cut. The hard unfractured quartz contains two small visible concentrations of galena with small amounts of pyrite, sphalerite, and pyrrhotite, and the rest of the vein quartz appears to be barren. A piece of selected quartz with galena assayed: Gold, 0.01 oz. per ton; silver, 6.3 oz. per ton; lead, 6.7 per cent. Evidently this was the showing seen by Bowman and mentioned* by him.

In the late 1930's an adit 48 feet long was driven from a point 30 feet west of the open-cut and at a slightly lower level. The adit is driven south 46 degrees east, and 29 feet from the portal crosses a 6-foot vein striking north 10 degrees east and dipping 30 degrees east; at the face of the adit is a 3- to 6-inch vein striking south 70 degrees east and dipping 60 degrees southwest. This vein is sparsely mineralized with galena, pyrite, and scheelite. The large vein in the adit evidently is the southern extension of a 30-foot length of vein 6 feet wide exposed just north of the open-cut. It is possible that the vein in the open-cut may be a branch of the larger northerly striking vein.

[References: *Dept. of Mines, B.C.*, Bull. No. 10 (Rev.), 1943, pp. 96, 97. *Geol. Surv., Canada*, Ann. Rept., 1887–88, Vol. III, Pt. I, Pt. C, 1889, p. 44c.]

Homestake
[22]

B. E. Taylor, of Wells, holds four claims comprising the Homestake group. They extend in single file down French Snowshoe Creek from Calgary Dam, which is about 3,500 feet upstream from Snarlberg. The claims take in the camp buildings at Snarlberg, which is at the end of the motor-road, 11 miles from Keithley Creek.

One showing consists of a quartz vein at about 4,700 feet elevation on the east bank of French Snowshoe Creek. The vein is southeast of the camp buildings and is reached from them by foot-trail.

The vein is in biscuit-brown weathering quartz sericite schist of the Snowshoe formation near the western contact of a wide band of Midas formation. An adit just above creek level is driven 22 feet eastward and exposes at its face a 26-inch quartz vein striking north 60 degrees east and dipping 75 degrees southeast. The quartz is well mineralized with pyrite. A selected sample containing about 50 per cent pyrite assayed:

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* *Geol. Surv., Canada*, Ann. Rept., 1887–88, Vol. III, Pt. I, Pt. C, p. 44c.

Gold, 0.22 oz. per ton. The vein is also exposed in the west bank of the creek, where it is 26 inches wide.

A second showing, of quartz mineralized with scheelite, is reached by a road from the north end of the second switchback above Snarlberg. The road was bulldozed 1,200 feet northward to a clearing where the Amparo Mining Company Limited proposed driving a low-level adit beneath the Midas showings. The vein is 100 feet south of the northeast corner of the Midas Extension No. 2 (Lot 4671). The vein is in massive red-brown weathering ankeritic quartzite. It strikes north 70 degrees east and dips 65 degrees northwest. A 2- to 3-foot width of unfractured quartz is exposed for a length of about 40 feet. The quartz contains streaks of galena and irregular, discontinuous masses of light buff-coloured scheelite.

Bowman's map of Snowshoe and Keithley Creeks* shows the Steele and Cunningham tunnel on the west side of French Snowshoe Creek upstream from the junction of Dutchman Creek. This adit has not been seen in recent years but is thought to be close to Snarlberg and may be on the Homestake claims. It is probable that the tunnel was driven on the showings of the Monte Christo Company (*see* p. 39), whose location is described as being 1¼ miles below the upper forks of the creek. The upper forks probably would be at Calgary Dam, and the distance of 1¼ miles would locate the adit well downstream from Dutchman Creek and not upstream from it as Bowman's map shows.

Imperial Vein
[11]

The Imperial vein outcrops at an elevation of 5,950 feet on the east side of Aster-Breakneck Ridge about 800 feet east of Aster B. The vein is in Midas black silty quartzite close to its western contact with Snowshoe basal conglomerate and lower grey quartzite which lie to the west. The vein is on the western flank of the anticline that extends southward from the head of Aster Creek.

The vein strikes north 5 degrees east and dips vertically to steeply eastward. It occupies a strong fault which cuts across the enclosing rocks. The vein is exposed in trenches and natural exposures for a length of about 1,100 feet. The largest segment of vein exposed is a natural outcrop of white quartz 100 feet long and 42 feet wide; in trenches it ranges from 6 to 13 feet wide. Near the southern end an adit, now caved, was driven westward across the vein. Some quartz on the dump of the adit is pitted with cavities from which pyrite has been leached, but, in general, no sulphide mineralization is seen in the quartz. The quartz is unfractured, except for several inches of crushed quartz along the walls.

[Reference: *Geol. Surv., Canada,* Paper 38-16, p. 34.]

International
[7]

The International group of eight claims and three fractions, Lots 3485 to 3495, has reverted to the Crown. The claims extend from the boundary of the Cariboo-Hudson ground southward down the steep slope into Simlock Creek. A trail from the Peerless No. 3 claim (Lot 3499) leads to a cabin on the Dawn No. 2 Fraction (Lot 3494) on Simlock Creek.

The claims are largely underlain by quartzitic rocks of the lower and middle Snowshoe members. The showings include a 2- to 4-inch vein near the northern boundary of the International No. 8 claim (Lot 3488) about 100 feet from its northwest corner. This vein is in a deep open-cut, now caved, and is reported to be mineralized with pyrite, galena, sphalerite, and arsenopyrite. An examining engineer records having obtained an assay of 3.19 ounces of gold per ton across 4½ inches.

Another quartz vein striking about north 85 degrees west and mineralized with pyrite is on the International No. 8 claim (Lot 3488), 150 feet southeast of the above vein. A selected sample, well mineralized with pyrite, is reported to have assayed 0.8 ounce of gold per ton.

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* *Geol. Surv., Canada,* Map 369, 1895.

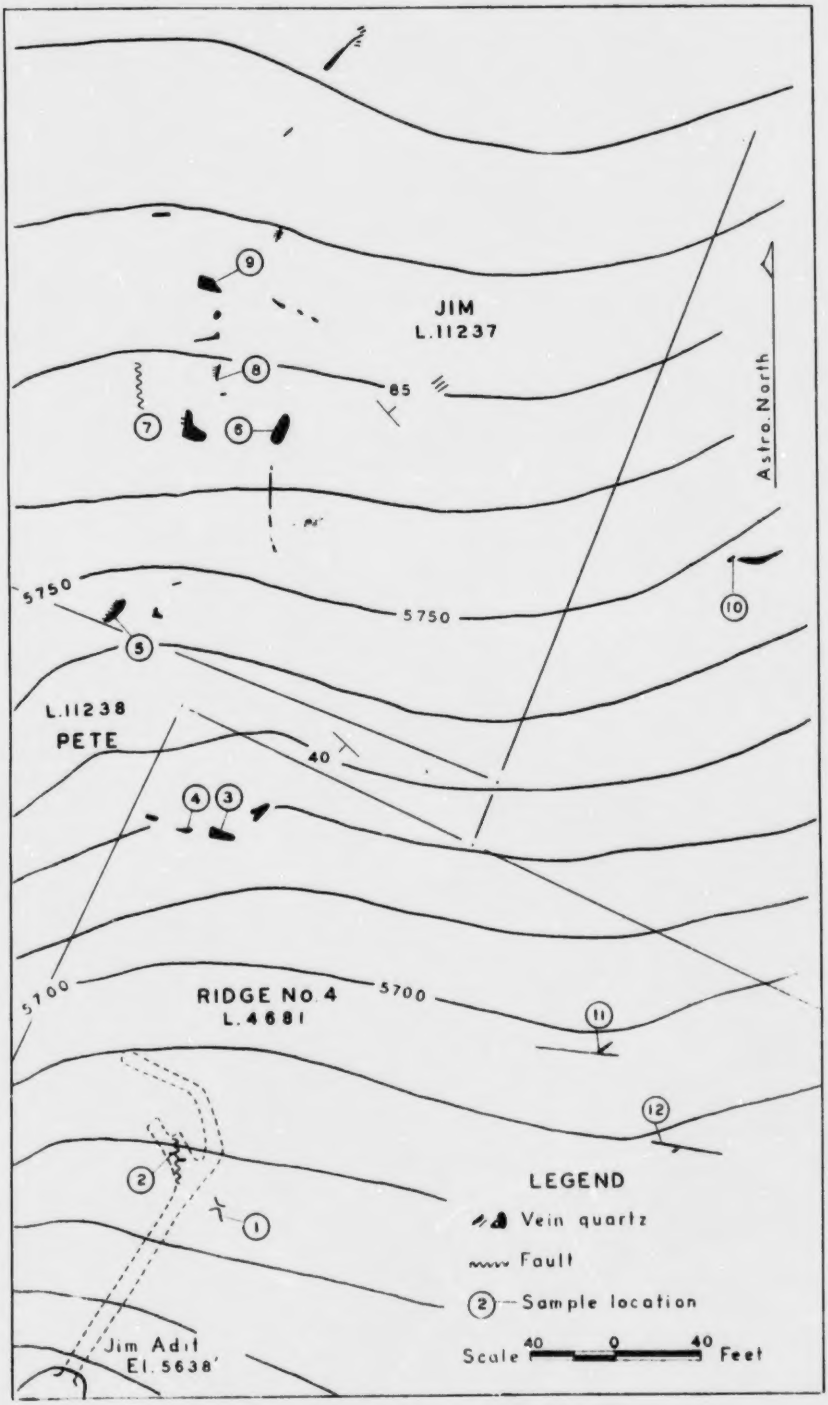
JIM
L.11237
85
Astro. North
5750
5750
L.11238
PETE
40
RIDGE No. 4
L.4681
5700
5700
Jim Adit
El. 5638'
1
2
3
4
5
6
7
8
9
10
11
12
LEGEND
Vein quartz
Fault
Sample location
Scale
40
0
40
Feet

Figure 8. Surface showings in the Jim vein zone.

Jim
[15]

The three Crown-granted claims Jim (Lot 11237), Pete (Lot 11238), and Ridge No. 4 (Lot 4681), and the Crystal group of recorded claims adjoining them on the north, are held by Lieut.-Col. F. H. M. Codville, of Duncan. Quartz veins are exposed in surface strippings in an area about 500 feet long and 200 feet wide (*see* Fig. 8). These surface showings constituting the Jim vein zone are near the southeast corner of the Jim claim. An adit whose portal is on the Ridge No. 4 claim and about 300 feet south of its northwest corner has been driven about 200 feet to explore the downward extension of the vein zone.

A few small quartz veins were noted by Bowman* on Horseshoe Gulch† at the head of Luce Creek, but the prospecting and stripping of the veins in the Jim zone was done by Colonel Codville, who located the Jim and Pete claims in June, 1936, and the ground now covered by the Crystal group in 1938. The adit was started in 1946. The claims are underlain by northwesterly striking, hard grey quartzites of the lower and middle Snowshoe members. These lie in a syncline whose western limit is an anticline of Midas black silty quartzite at the northwest corner of the Pete claim and whose eastern limit is a narrow anticline of Midas black silty quartzite at the northeast corner of the Jim claim. This structure, the Jim syncline, is continuous from Horseshoe Nail Gulch to French Snowshoe Creek. Its axial plane is close to the Jim vein zone and trends southeastward through the Jim claim.

Surface stripping in the northwest corner of the Ridge No. 4 claim and in the southeast corner of the Jim claim has exposed a large number of veins which lie in a zone about 500 feet long and 200 feet wide and whose general trend is a few degrees west of north. Many of the vein outcrops are incompletely exposed, and many of them seem irregular in outline. Their irregularity in shape is the result of the veins forming along two intersecting fracture sets, one striking northeastward (north 40 to 60 degrees east) and the other striking eastward (north 80 degrees east to south 80 degrees east); few veins occupy a simple fracture of one direction or the other. As a rule one fracture direction dominates, and offshoots from the vein occupy fractures having the other direction. Commonly veins shown in Figure 8 strike north 45 degrees east with offshoots striking north 80 degrees east.

The quartz ranges from small veinlets a few inches wide to masses from 4 to 6 feet across. In general, the quartz is sparsely mineralized with pyrite and galena. Visible gold may be present in and around areas from which pyrite has been leached. High gold assays have been obtained from some samples, and visible gold is reported to have been seen in several outcrops. Most visible gold was seen in the vein about 50 feet northwest of the northwest corner of the Ridge No. 4 claim.

Several northerly striking faults, which offset the veins a matter of a few feet, are seen in the open-cuts. The two veins about 300 feet northeast of the Jim adit are cut by steeply dipping faults striking north 70 degrees east, on which the movement is very small. Striations on the fault planes plunge 70 degrees west.

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* *Geol. Surv., Canada*, Ann. Rept., 1887–88, Vol. III, Pt. 1, Pt. C, p. 45.

† Old maps show a Horseshoe Gulch at the head of Luce Creek. The present Horseshoe Nail Gulch is at the head of Aster Creek.

The following tabulated assays are of samples taken from the vein outcrops in 1950. The sample locations are shown on Figure 8.

SAMPLING OF JIM VEINS ON SURFACE

Sample No. on Fig. 8	Width		Description	Gold	Silver
	Ft.	In.		Oz. per Ton	Oz. per Ton
1	1	8	Quartz with some ankerite and rare grains of pyrite on walls	0.01	*Nil*
2	1	8	Quartz with unreplaced remnants of wallrock and rare pyrite grains	0.01	*Nil*
3	3	0	Quartz with rare grains of pyrite	0.01	*Nil*
4	2	0	Fractured quartz with no visibile mineralization	0.02	*Nil*
5	4	0	Quartz mineralized with pyrite and some galena; free gold observed in vein	0.10	*Nil*
6	4	6	Quartz mineralized with pyrite and galena	0.08	*Nil*
7	3	4	Quartz with ribbons of country rock	*Nil*	*Nil*
8	3	0	Fractured quartz with rare grains of galena	0.01	*Nil*
9	7	0	Quartz with some pyrite mineralization	0.20	*Nil*
10	2	6	Fractured, iron-stained quartz, no visible mineralization	*Nil*	*Nil*
11	1	6	Fractured quartz with small amount of ankerite	0.01	*Nil*
12	1	4	Fractured quartz with small amount of ankerite	Trace	0.20

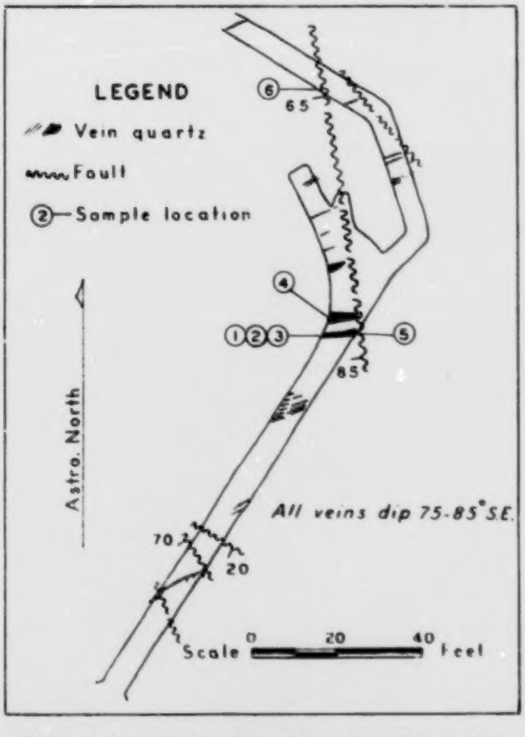

Figure 9. Jim adit, showing veins and sample locations.

The Jim adit was started in 1946 to explore the Jim vein zone at depth. The portal is about 320 feet south of the northwest corner of the Ridge No. 4 claim. The elevation of the portal is 5,638 feet, and that of the vein outcrops ranges from 5,670 to 5,790 feet. The adit (*see* Fig. 9) is driven north 33 degrees east for 105 feet, where it is crossed by a northerly striking fault. One branch 40 feet long was driven northward along the west side of the fault, and another 93 feet long was started on the east side of the fault but crossed back to the west side near the face of the drive. The northerly striking fault is exposed in two places underground as a gouge zone 2 to 4 feet wide. It has a strike of north 8 degrees west and a steep westerly dip. The amount and relative direction of movement are not known. All the veins underground, of which there are many, strike northeastward (about north 70 degrees east) and dip steeply southward. They range in width from a few inches to 30 inches, but most are less than 12 inches wide. The veins are sparsely mineralized with pyrite and galena and moderate amounts of ankerite. High gold assays are obtainable from concentrations of pyrite (*see* sample Nos. 1 and 3 of Fig. 9), but most assays are low because of the small pyrite content.

Assays of samples taken in the Jim adit are listed in the following table. Sample locations are shown on Figure 9.

ASSAYS OF SAMPLES FROM JIM ADIT

Sample No. on Fig. 9	Width		Description	Gold	Silver
	Ft.	In.		Oz. per Ton	Oz. per Ton
1			Selected quartz with 75 per cent pyrite	2.30	0.3
2			Selected quartz with less than 5 per cent total pyrite and galena	Trace	0.6
3			Selected quartz with about 50 per cent pyrite	1.60	0.4
4	1	8	Fractured quartz with rare bunches of pyrite	0.10	*Nil*
5	1	5	Iron stained quartz with streaks and patches of pyrite	0.19	Trace
6	2	2	Sheared quartz in fault with some pyrite	*Nil*	*Nil*

Midas
[19, 20]

The Midas property consists of a number of Crown-granted mineral claims, of which the more important are the Saddle (Lot 4668), Saddle Extension (Lot 4669), Midas (Lot 4670), Midas Extension No. 2 (Lot 4671), Midas Extension No. 1 (Lot 4673), West Midas Extension No. 1 (Lot 4677), and A. T. Fraction (Lot 4674). These and others are owned by Lieut.-Col. F. H. M. Codville, of Duncan. The claims lie east and northeast of the summit of Yanks Peak and on the top and sides of the ridge between the head of Luce Creek and French Snowshoe Creek.

Many of the known veins were found at the time of the first quartz stakings in the 1860's. Bowman's map shows the position of the Steele Ledge and the Galena Ledge, which probably are the ones now known, respectively, as the Tait vein and the Lipsey vein. The Saddle vein, as currently known, cannot be identified with any described by Bowman.

Interest in quartz veins dwindled after the first stakings in the 1860's and 1870's, and very little work other than a small amount of surface prospecting was done at that time. In the early 1920's J. Glover and O. J. Pickering began prospecting in the vicinity of Yanks Peak, and in 1923 they located the Saddle and Saddle Extension claims (Lots 4668 and 4669) to cover their discovery (or rediscovery) of the Saddle vein. In succeeding years Glover and Pickering drove a crosscut adit southeastward for about 500 feet to explore the vein at a depth of about 117 feet below its outcrop. In 1933 Britannia Mining and Smelting Co. Limited took an option on the Saddle, Midas, and associated claims and organized Saddle Mines Ltd. This company, during 1933 and 1934, sank a shaft on the Saddle vein to connect with the crosscut driven by Glover and Pickering and did some surface trenching and prospecting to the northeast on the Tait, Lipsey, and other veins in that vicinity. In 1938 Cariboo Mines Ltd. was organized by Amparo Mining Co. Ltd., of Philadelphia. This company acquired the Saddle and Midas groups of claims as well as others northeast of the head of Luce Creek. The company built the camp at Snarlberg, built the road up the hill to the old camp at the Midas, drove a long exploratory crosscut at the Midas, and did about 35,000 feet of bulldozer stripping before stopping work in 1940. When the Amparo company went into voluntary liquidation, Lieut.-Col. F. H. M. Codville bought certain of the Crown-granted mineral claims. During 1948 Colonel Codville installed a 15-ton Gibson ball mill and a Wilfley table in a log building at the portal of the Midas adit, and in late July, 1949, began to concentrate ore mined from a sublevel in the Saddle shaft. This operation was unprofitable, and was stopped in September, 1949, after gold-bearing concentrates having a gross value of $438 had been produced.

The quartz veins of chief interest on the Midas property, the Saddle, Lipsey, Tait, Slim, and others, are exposed on the top and southeast slope of the northeast ridge of Yanks Peak. They are in a belt of Midas formation that extends northwestward from French Snowshoe Creek (*see* Fig. 2, Sheet A, and Fig. 11). On its western side the belt is bounded by the rather sinuous trace of the Yanks Peak quartzite which crosses French Snowshoe Creek at J. Sockett's showing, runs northwestward up the lower valley slopes, swings to a more northerly direction through the western part of the Saddle Extension claim (Lot 4669), and then swings northwest and west across the north face of Yanks Peak at elevations between 5,500 and 6,000 feet. The eastern side of the belt is in contact with the Snowshoe formation which extends in a fairly straight line northwestward from Snarlberg. On top of the ridge the belt has a width of about 3,500 feet.

All the various types of rock making up the Midas formation are exposed, the predominant types being medium- to dark-grey argillaceous or sericitic schists and black silty quartzite.

In the vicinity of the veins the rocks strike northwest and dip steeply southwest. They are on the overturned limb of the large Yankee Belle anticline whose axial plane lies about 1,800 feet west of the peak. The rocks within the belt are most intricately folded—an interpretation of the internal structure was made on page 29 and is illustrated by the traces of the Midas quartzite on Figure 11.

The complexities of the smaller-scale folding are the result of dragfolding and flowage of relatively incompetent beds. Apart from dragfolds, the main features of the internal structure are two anticlines which may be the southerly extensions of the two anticlines lying north of Little Snowshoe Creek.

Saddle Vein [20].—The Saddle vein is at 5,765 feet elevation on the top of the ridge 2,300 feet east of Yanks Peak. The vein is near the southern margin of the Saddle claim.

Glover and Pickering exposed the vein in an open-cut about 40 feet long. From it Lay[*] in 1929 obtained five samples of the vein, which assayed: Gold, 2.24 oz. per ton across 7 feet; gold, trace across 2½ feet; gold, 0.08 oz. per ton across 3 feet 10 inches; gold, 3.34 oz. per ton across 1½ feet; and gold, 0.88 oz. per ton across 2½ feet. In 1930 Lay again sampled the vein in the open-cut, with the following results:[†] Gold, 0.78 oz. per ton across 2 feet 7 inches; gold, 3.84 oz. per ton across 5 feet 3 inches; gold, 0.75 oz. per ton across 2 feet 11 inches; gold, 0.83 oz. per ton across 4 feet; gold, 0.36 oz. per ton across 4 feet; gold, 0.50 oz. per ton across 3½ feet; and gold, 0.30 oz. per ton across 6 feet.

From the west side of the ridge at an elevation of 5,647 feet, Glover and Pickering drove a crosscut adit southeastward for a distance of about 500 feet to explore the vein at a depth of about 117 feet below the outcrop. The portal of the adit is caved, and these lower workings are inaccessible.

In 1933 Britannia Mining and Smelting Co. Limited sank a shaft on the vein to connect with the adit. Although the lower part of the shaft is now inaccessible, a copy of the assay plan of sampling done in the shaft by the Britannia company was made available by Mr. Pickering. The assays and widths of vein are shown on Figure 10.

In 1949 Colonel Codville bulkheaded the shaft at a depth of 37 feet and drove a sublevel 9 feet north and 18 feet south. About 50 tons of vein quartz was hauled to the mill at the portal of the Midas adit and milled in August, 1949.

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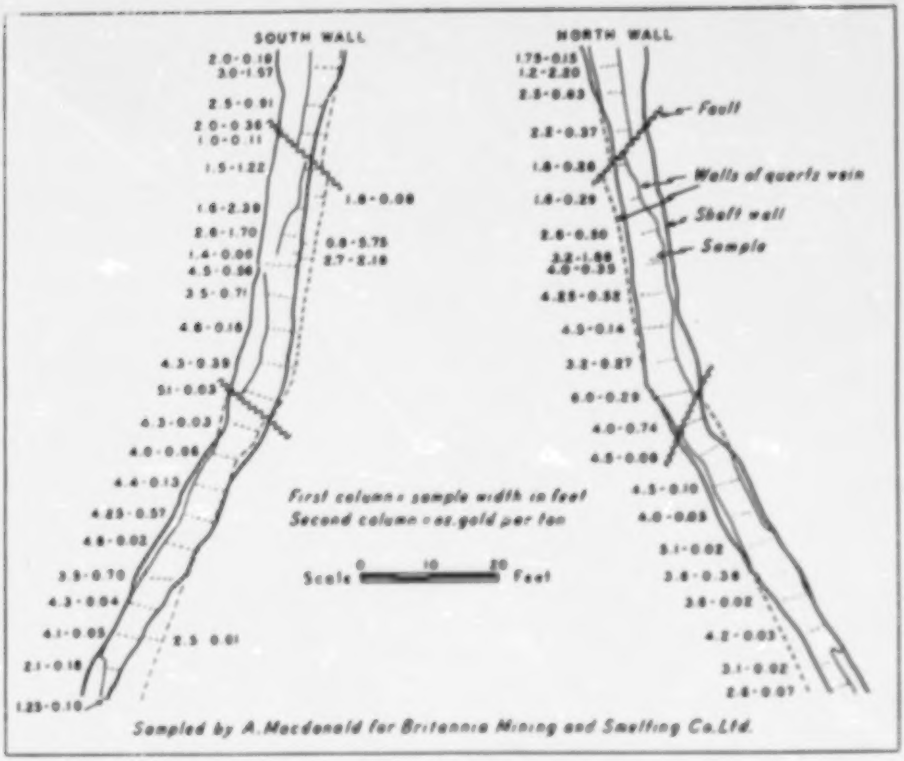
[*] *Minister of Mines, B.C.*, Ann. Rept., 1929, p. 191.

[†] *Minister of Mines, B.C.*, Ann. Rept., 1930, p. 176.


SOUTH WALL
NORTH WALL
2.0-0.18
3.0-1.57
2.5-0.81
2.0-0.38
1.0-0.11
1.5-1.22
1.8-0.08
1.6-2.38
2.8-1.70
0.8-5.75
2.7-2.18
1.4-0.08
4.5-0.38
3.5-0.71
4.8-0.18
4.3-0.38
5.1-0.03
4.3-0.03
4.0-0.08
4.4-0.13
4.25-0.57
4.8-0.02
3.5-0.70
4.3-0.04
4.1-0.05
2.5 0.01
2.1-0.18
1.25-0.10
1.75-0.15
1.2-2.20
2.5-0.83
Fault
2.2-0.37
1.8-0.38
Walls of quartz vein
1.8-0.29
Shaft wall
2.8-0.50
Sample
3.2-1.88
4.0-0.35
4.25-0.32
4.5-0.14
3.2-0.27
6.0-0.29
4.0-0.74
4.5-0.08
4.5-0.10
4.0-0.05
3.1-0.02
3.8-0.38
3.8-0.02
4.2-0.03
3.1-0.02
2.8-0.07
Scale
0
10
20
Feet

First column = sample width in feet
Second column = oz. gold per ton

Sampled by A. Macdonald for Britannia Mining and Smelting Co. Ltd.

Figure 10. Assay plan of the Saddle shaft.

The Saddle vein is exposed in an open-cut for a length of about 80 feet. South of the shaft it pinches to 1 foot in width, and north of the shaft it maintains a width of about 4 feet for about 60 feet. The vein terminates abruptly at its northern end against a branch of the northerly striking fault whose zone it occupies. There has been post-mineral movement along the east side of the vein, and striations on the walls, seen both at surface and underground, plunge about 20 degrees south. The amount of displacement along the fault is not known. The vein strikes about north 5 degrees west, dips 65 to 80 degrees east, and cuts across the Midas rocks, whose general strike is about north 40 degrees west.

A band of Midas black silty quartzite about 100 feet wide and outcropping for a length of about 300 feet lies on the west side of the Saddle vein and is truncated by it. The Midas black silty quartzite band is thought to occupy an anticlinal septum, but its relationship to the complexly dragfolded structure about 400 feet southeast is not apparent. The rock on the east side of the vein is grey argillaceous and sericitic schist, and no extension of the black silty quartzite is to be seen.

A wide crush zone, parallel to the formation and about 200 feet west of the Saddle shaft, is exposed in bulldozed trenches for more than 2,000 feet. It is not known whether this crush zone is a strike-fault or not (*see* p. 34).

The Saddle vein is mineralized with pyrite and some galena. At a depth of 37 feet in the shaft, solid pyrite about 3 inches thick lies along the footwall of the vein. A few vein fragments on the dump were seen to contain visible gold in the quartz as well as in cavities from which pyrite had been leached.

The assays in the following table are of samples of Saddle vein quartz taken in 1949 and 1950. The locations of surface samples are shown on Figure 11.

SAMPLES FROM SADDLE VEIN

Sample No. on Fig. 11	Width		Description	Gold	Silver
	Ft.	In.		Oz. per Ton	Oz. per Ton
—	—	—	Pocket at Saddle headframe—fine quartz ore	0.34	*Nil*
—	—	—	Spillings inside mill of fine ore from Saddle vein	0.18	*Nil*
—	—	—	Saddle shaft, north face of sublevel—4 feet of quartz with very little pyrite	*Nil*	0.1
—	—	—	Saddle shaft—selected quartz with 40 per cent pyrite from footwall of sublevel at 37 feet depth	1.66	1.2
46	4	0	Open-cut, 22 feet north of shaft—crushed quartz, no mineralization apparent	*Nil*	*Nil*
47	4	2	Open-cut, 16 feet north of shaft—quartz with small amount of pyrite along east wall	*Nil*	*Nil*
48	4	0	Open-cut, 9 feet north of shaft — quartz with small amount of pyrite along east wall	0.01	*Nil*
49	4	0	Open-cut, 3 feet north of shaft—massive quartz, sparse pyrite	1.04	*Nil*
50	2	6	Open-cut, 2 feet south of shaft—fractured iron-stained quartz	0.71	*Nil*

Midas Vein Zone.—The Midas veins, which include the Tait, Lipsey, Slim, Allan, and other unnamed veins, outcrop on the top and east side of the ridge between French Snowshoe Creek and the head of Luce Creek. They are about 1,000 feet northeast and east of the Saddle shaft. Two veins in that general area are shown on Bowman's map of Little Snowshoe Creek, and it is probable that the Steele Ledge is now called the Tait vein and the Galena Ledge the Lipsey vein.

The Britannia company did some surface stripping and sampling of the veins in 1933 and 1934, but most work was done by the Amparo company. This company stripped and sampled all the known veins, and in the process of doing about 35,000 lineal feet of bulldozer stripping discovered numerous other veins. The bulldozer trenches explore the band of Midas formation between its contacts with the Yanks Peak quartzite and the basal Snowshoe member, from the fifth switchback above Snarlberg across to the Saddle shaft and uphill to the crest of the ridge. Were it not for the bedrock exposed in these trenches, the geological mapping of this area would be impossible.

Figure 11 shows the distribution of the several members of black silty quartzite which, with other rock types, comprise the Midas formation. With very few exceptions, all the Midas veins are in grey argillaceous and sericitic schists rather than in black silty quartzite or ankeritic rock.

Most of the veins lie in a single zone (*see* Fig. 11) which extends from the Allan vein on top of the ridge at 5,690 feet elevation for about 2,000 feet downhill in a direction south 15 degrees east to about 5,375 feet elevation. This zone outcrops within an area of grey argillaceous schist which is flanked on the west by middle Midas black silty quartzite and on the east by upper Midas black silty quartzite. These rocks lie in a wedge whose apex at about 5,350 feet elevation points downward (*see* pp. 29, 30). The wedge-like cross-section is a shape imposed by regional structures, and consequently it is believed that its apex will plunge northwestward parallel to the 20-degree regional plunge.

A few veins lie outside the main vein zone and are part of no recognizable zone.

About twenty-five large veins as well as other narrower and shorter ones outcrop within the Midas vein zone. A few near the crest of the ridge have been named, mainly because they are large or contain visible gold, but the rest are not designated separately.

The individual veins strike northeastward or eastward. Some of them are straight, but others are either slightly curved or step-like because alternate sections of the vein occupy one of two main fracture directions (*see* p. 40 and Fig. 6). One prominent fracture direction is north 60 to 70 degrees east, and entire veins or segments of veins may have this strike. The other fracture direction ranges from north 80 degrees east to south 80 degrees east. Some veins may have this strike or be composed of short segments whose strike may vary 10 to 15 degrees from it. Other veins combine segments occupying fractures that strike northeastward and eastward.

Although the veins range in width from a few inches to a maximum of 4 feet, most veins are commonly between 12 and 20 inches wide. The longest vein, the Slim vein, is about 175 feet long, and the others are considerably shorter.

The veins are all sparsely mineralized with pyrite and less abundant galena. Ankerite is present in most veins, either disseminated throughout the vein or as a narrow selvage along the vein wall. Visible gold is present in the Tait and Station 4 veins, and is reported to have been found in several others downhill from the Slim vein. It is possible to pan fine gold from broken material at the outcrops of several veins.

The following assays are from samples obtained from the Midas vein zone. The sample locations are shown on Figure 11.

SAMPLES FROM MIDAS VEIN ZONE

Sample No. on Fig. 11	Width		Description	Gold	Silver
	Ft.	In.		Oz. per Ton	Oz. per Ton
6	1	0	Quartz with ankerite along the walls	*Nil*	0.9
7	2	9	Allan vein—massive quartz, no visible mineralization	*Nil*	*Nil*
8	1	8	Allan vein—massive quartz, no visible mineralization	*Nil*	*Nil*
9	1	6	Quartz with ankerite along walls but no mineralization	*Nil*	*Nil*
10	1	4	Tait vein—quartz with ankerite and rare grains of pyrite	0.01	*Nil*
11	1	4	Tait vein—fractured quartz with rare pyrite grains	*Nil*	*Nil*
12	1	8	Tait vein—fractured quartz with unreplaced wallrock fragments	*Nil*	*Nil*
13	1	4	Quartz with limonite	*Nil*	*Nil*
14	2	9	Quartz with ankerite and no visible mineralization	0.03	*Nil*
15	1	8	Fractured quartz, iron-stained, no mineralization	*Nil*	*Nil*
16	4	0	Slightly fractured quartz with ankerite along walls	*Nil*	*Nil*
17	3	4	Slightly fractured quartz with ankerite along walls	0.01	*Nil*
18	1	6	Station 4 vein—quartz with scattered ankerite	*Nil*	*Nil*
19	2	4	Station 4 vein—quartz with scattered ankerite and thin ribbons of unreplaced wallrock	0.07	*Nil*
20	4	0	Station 4 vein—quartz with minor ankerite and no visible mineralization	0.01	*Nil*
21	1	8	Station 4 vein—massive quartz, minor ankerite along walls	*Nil*	*Nil*
22	2	2	Slim vein—massive quartz, no visible sulphides	*Nil*	*Nil*
23	2	6	Slim vein—massive quartz, rare grains of pyrite	*Nil*	*Nil*
24	1	0	Slim vein—iron-stained quartz, rare grains of pyrite	*Nil*	*Nil*
25	1	6	Slim vein—massive quartz with some pyrite near one wall	0.08	*Nil*
26	3	4	Massive quartz with a few grains of pyrite and galena, visible gold present	0.13	*Nil*
27	4	6	Sheared quartz, iron-stained, no pyrite visible	0.01	*Nil*
28	1	0	Iron-stained quartz, no visible mineralization	*Nil*	*Nil*
29	2	6	Quartz with minor ankerite along walls and no visible mineralization	*Nil*	*Nil*
30	1	8	Quartz with minor scattered ankerite, no visible mineralization	*Nil*	*Nil*
31	1	8	Massive quartz with scattered ankerite along walls	*Nil*	*Nil*
32	2	0	Visible gold reported from this vein, no visible mineralization	*Nil*	*Nil*
33	2	6	Massive quartz with minor ankerite along walls and rare pyrite grains	Trace	*Nil*
34	2	8	Visible gold reported from this shaft, massive quartz	*Nil*	*Nil*
35	1	2	Massive iron-stained quartz, rare grains of pyrite	0.01	*Nil*
36	1	8	Slightly fractured quartz, iron-stained, no visible mineralization	*Nil*	*Nil*
37	1	8	Iron-stained quartz with rare grains of pyrite	*Nil*	*Nil*
38	1	2	Quartz with small remnants of wallrock, some ankerite, no visible mineralization	*Nil*	*Nil*
39	1	2	Massive quartz with minor ankerite along walls	*Nil*	*Nil*
40	1	3	Massive quartz with minor ankerite	*Nil*	*Nil*
41	1	3	Massive quartz with scattered ankerite	*Nil*	*Nil*
42	1	0	Quartz with minor scattered ankerite, rare pyrite grains near walls	Trace	*Nil*
43	1	6	Gold panned from outcrop of this vein, fractured quartz with less than 1 per cent pyrite	*Nil*	*Nil*

Lipsey and Other Veins.—Three large outcrops of quartz lie just west of the Midas vein zone and close to the eastern edge of an anticline of middle Midas black silty quartzite. An open-cut has been made on each quartz outcrop, but continuity has not been proved between them. They are thought to represent segments of three separate northerly striking veins.

The northernmost outcrop exposes a lens of vein quartz having a maximum width of 11 feet tapering to 3 feet and 6 feet at the ends of the open-cut. Two samples

(Nos. 1 and 2 on Fig. 11)—one across 11 feet and the other across 2½ feet of quartz containing unreplaced fragments of wallrock and no visible pyrite—assayed: Gold, *nil.*

The centre open-cut exposes the Lipsey vein continuously for a length of 30 feet, and north of the outcrop exposes a 12-foot piece of quartz which may be a large boulder. The Lipsey vein strikes slightly west of north and dips steeply to the east. It occupies a small northerly striking fault zone. The vein is mineralized with galena and less pyrite and sphalerite. Visible gold is present in unmineralized quartz as well as in and around cavities from which pyrite has been leached. Three samples of sparsely mineralized quartz (Nos. 3, 4, and 5 on Fig. 11) assayed: Gold, *nil* across 3½ feet; gold, 0.06 oz. per ton across 8 feet; and gold, 0.07 oz. per ton across 4 feet. This vein is shown on Bowman's map as the Galena Ledge.

The southern open-cut exposes shattered quartz for a length of about 25 feet. A shear along the east side strikes north 20 degrees west, and a narrow prong of quartz extends southwestward from the main mass along a fracture. A sample (No. 26 on Fig. 11) across 3 feet 4 inches of massive quartz containing sparse pyrite and galena, and showing visible gold near the galena mineralization, assayed: Gold, 0.13 oz. per ton.

Midas Adit [19].—The Amparo company drove a crosscut southeastward from the northwest side of the ridge at the head of Luce Creek to explore the downward extension of the Midas vein zone and of the three large veins just west of it. Neither the company's plans of the crosscut and surface workings nor their extensive assay plans are available. The plan in Figure 12 is from a tape and compass survey of the workings.

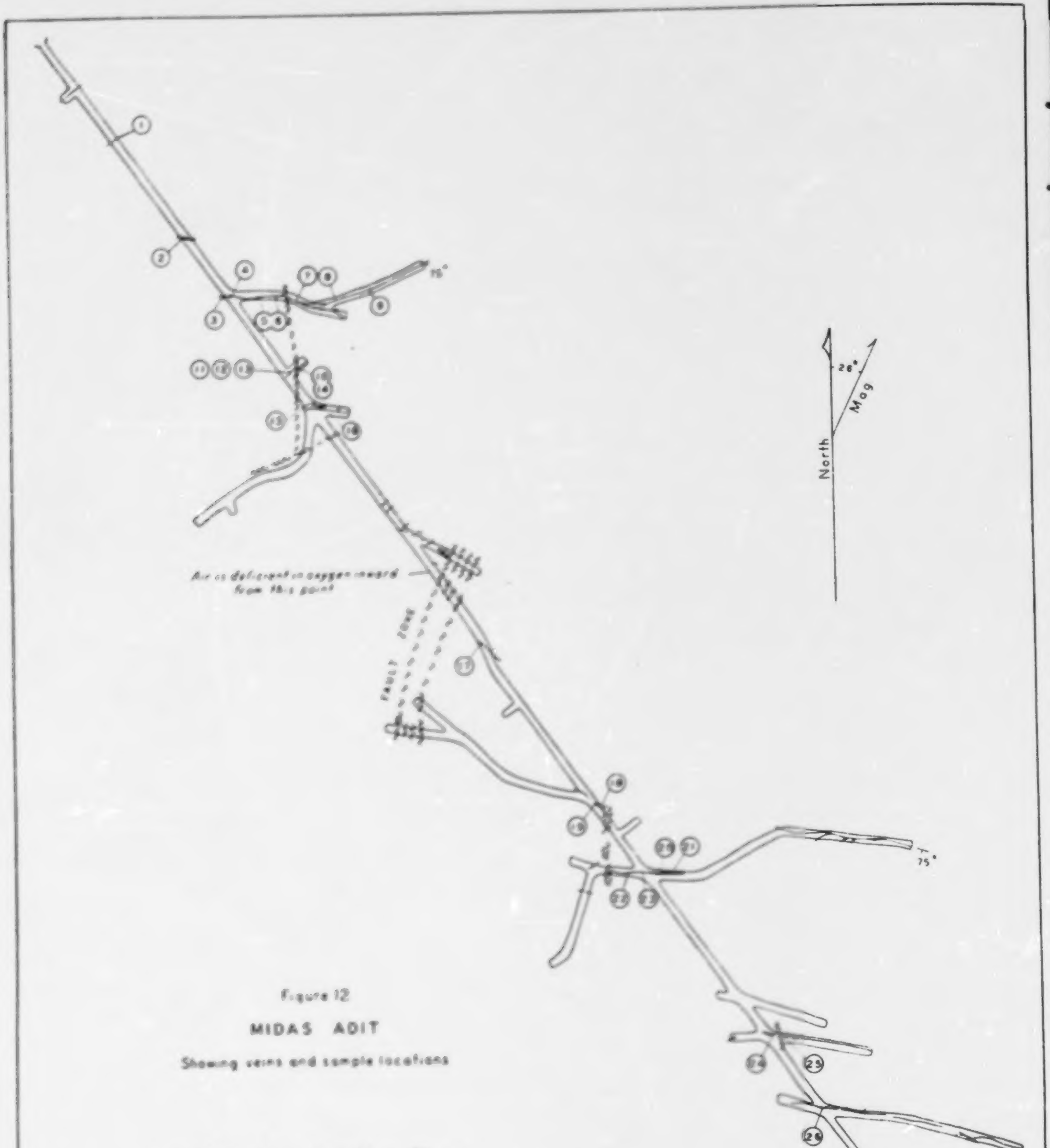
All the workings are accessible, except for a short section which is caved near the end of the second crosscut on the west side. The air is good for about 500 feet in from the portal, but beyond that point there is a deficiency of oxygen and a match or candle will not burn. Safety precautions should be observed by anyone examining these workings.

The Midas workings consist of an almost straight crosscut about 1,200 feet long bearing south 36 degrees east, and about 1,300 feet of lateral workings, drifts on veins, and exploratory crosscuts (*see* Fig. 12).

The rocks exposed underground are dark-grey ankeritic argillaceous schists and slates with some thin quartzite layers. No black silty quartzite corresponding to the middle or upper Midas black silty quartzite was identified. No beds seen on surface could be correlated with any exposed underground, and no interpretation of the folding within the wedge-shaped mass could be made (*see* p. 29). A northerly striking fault crosses the workings and appears in three places as a zone of shattered rock about 20 feet wide. The direction of movement on this fault is unknown, and although the displacement is unknown, it is thought to be small in amount. At least three other small northerly striking faults are exposed in the underground workings.

Crosscuts were driven on the west side of the main adit in an attempt to find downward continuations of the three large northerly striking veins exposed on surface. In the crosscut beneath the most northerly vein there is a swarm of small quartz veinlets and an area of partial silicification, but there is no vein. A wide zone of sheared and faulted rock was encountered in the crosscut below the Lipsey vein. This may be the same shear as that exposed on surface, but there is no vein in it underground. The crosscut beneath the southernmost vein did not cross any quartz corresponding to the surface showing.

The working intersects at least twenty quartz veins. The veins occupy fractures which strike north 50 to 60 degrees east and dip steeply southeast, or which strike about south 85 degrees east and dip steeply south. The easterly striking veins have short, narrow offshoots striking northeastward. Some of the easterly striking veins have been followed by drifts as far as 150 feet. Four such veins on the east side of the main adit from 800 to 1,200 feet from the portal are directly beneath outcrops of the Midas vein zone, but the veins exposed underground are not necessarily the same as those exposed on surface.


1
2
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75°
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15
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Air is deficient in oxygen inward from this point
FAULT ZONE
17
18
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22
23
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26
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North
Mag
28°
Scale 40 0 40 80 120 Feet

Figure 12

MIDAS ADIT

Showing veins and sample locations

The veins are very sparsely mineralized with pyrite, galena, sphalerite, and ankerite. When the crosscut was being driven, visible gold was seen in a narrow vein crossing the adit 247 feet from the portal. Two samples taken by the Amparo company, quoted in a report by J. B. Knaebel to the manager, from the west side of the crosscut and of selected material from which visible gold had been discarded assayed: Gold, 1.97 oz. per ton, and gold, 4.49 oz. per ton.

Another narrow vein 325 feet from the portal, which was well mineralized with pyrite and sphalerite, contained abundant visible gold when first encountered in the main adit. Two samples taken by the Amparo company averaged 35.39 ounces of gold per ton.

The following assays are of samples of veins in the Midas adit. The sample locations are shown on Figure 12.

SAMPLES FROM MIDAS ADIT

Sample No. on Fig. 12	Width		Description	Gold	Silver
	Ft.	In.		Oz. per Ton	Oz. per Ton
1	1	4	Fractured quartz with unreplaced wallrock, no mineralization	*Nil*	*Nil*
2	1	8	Fractured quartz with less than 5 per cent ankerite	*Nil*	*Nil*
3	1	4	Free gold reported from this vein; quartz with fragments of unreplaced wallrock and about 1 per cent pyrite	0.69	*Nil*
4	1	6	Quartz with 10 per cent ankerite and 1 per cent pyrite	0.22	*Nil*
5	1	4	Massive quartz with ankerite along walls	*Nil*	*Nil*
6	2	2	Massive quartz; no mineralization seen	*Nil*	*Nil*
7	1	8	Fractured quartz with 40 per cent ankerite	0.01	*Nil*
8	0	6	Quartz with ankerite along walls and specks of pyrite	0.36	*Nil*
9	1	8	Quartz with 10 per cent ankerite on walls and some disseminated pyrite	*Nil*	*Nil*
10	0	6	Quartz with minor ankerite and tiny grains of pyrite	*Nil*	*Nil*
11	—	—	Selected quartz with sphalerite and no pyrite	2.84	0.2
12	—	—	Selected quartz with pyrite and no sphalerite	3.10	0.4
13	0	2	Quartz with ankerite along walls; no mineralization seen	0.24	Trace
14	—	—	Selected sample of above containing 50 per cent pyrite	0.32	*Nil*
15	1	10	Quartz with 10 per cent scattered ankerite and some pyrite	Trace	0.3
16	1	11	Fractured quartz, 10 per cent ankerite and rare grains of pyrite	*Nil*	*Nil*
17	1	0	Quartz with bunches of pyrite	*Nil*	*Nil*
18	1	4	Fractured quartz with 5 per cent ankerite and 2 per cent pyrite in bunches	0.10	*Nil*
19	—	—	Selected pyrite from vein along fault	0.30	0.1
20	1	0	Fractured quartz with a small amount of ankerite along walls	*Nil*	*Nil*
21	1	0	Quartz with scattered grains of ankerite and some pyrite	*Nil*	*Nil*
22	0	10	Quartz containing rare bunches of pyrite	0.10	*Nil*
23	1	0	Quartz with ankerite along walls	*Nil*	*Nil*
24	1	0	Fractured quartz with 5 per cent scattered ankerite and rare grains of pyrite	*Nil*	*Nil*
25	0	6	Selected sample of quartz with about 50 per cent pyrite; best mineralization seen in the drift	0.78	*Nil*
26	1	0	Selected sample of 20 per cent pyrite from vein in drift	Trace	*Nil*
27	0	6	Quartz with rare specks of pyrite	0.05	*Nil*

[References: *Minister of Mines, B.C.*, Ann· Rept., 1886, p. 228; 1925, p. 162; 1929, p. 193; 1930, p. 176; 1933, p. 137; 1934, p. C 29; 1938, p. C 47; 1939, p. 71; 1940, p. 57; 1949, p. 103. *Geol. Surv., Canada,* Paper 38-16, pp. 38–40.]

Plateau d'Or Vein
[14]

The Plateau d'Or showings are between 5,600 and 5,700 feet elevation near the head of French Snowshoe Creek and about 3,000 feet northeast of the Jim adit. The showings at one time were on claims held by P. Gorrie. The two veins are in an anticline of Midas black silty quartzite near its eastern contact with basal and lower Snowshoe conglomerate and grey quartzite. The veins are exposed in several large open-cuts. The two main veins are in black silty quartzite and lie in faults which cut across the dip of the cleavage but which seem to be parallel in strike to the enclosing rocks. They are close to the contact with grey gritty quartzite which overlies the black slates and silty quartzites and which outcrops in a band lying downhill to the east.

Both main veins are exposed in a long open-cut at the northern end of the showings. The eastern vein appears to be the more continuous and occupies a fault which strikes north 25 degrees west and dips 80 degrees to the northeast, cutting across the 40-degree northeasterly dipping beds. Drag structures suggest that the downthrow side is on the east. This eastern vein is about 3 feet wide in the open-cut and reaches a maximum width of 8 feet in outcrops 50 feet to the south. It is exposed in open-cuts on both sides of a draw 125 feet to the south. On the north side of the draw the vein is about 4 feet wide and is seen to contain a small amount of pyrite. A selected sample of quartz containing about 10 per cent pyrite and some lacy-textured marcasite assayed: Gold, *nil.* On the south side of the draw, vein quartz having a width of 4 feet at surface pinches out at a depth of 8 feet. The southernmost exposure is 240 feet south. There, what is presumed to be the east vein, about 2 feet wide and striking north 25 degrees west, is joined from the southwest by a vein 24 to 28 inches wide, striking north 65 degrees east, and mineralized with black sphalerite and galena in irregular concentrations. Several open-cuts farther south do not appear to have encountered any vein quartz.

The west vein is exposed in the large open-cut at the north end of the showings. It is 30 feet west of the east vein, is 4½ feet wide, strikes north 25 degrees west, and stands vertical. Sixty feet south 2 feet of quartz is exposed in an open-cut, and 95 feet farther south and about 24 feet west of the east vein there is a large amount of vein quartz which, from Lang's description,* has a maximum width of 8 feet. At present one sees only a width of 2½ feet. The quartz is honeycombed with cavities from which pyrite has been leached, and is mineralized with some galena. The west vein is not traced south of this point, and even its northward continuity between open-cuts may be uncertain. Undoubtedly more could be seen when the open-cuts were newly made, but no recent work has been done.

[Reference: *Geol. Surv., Canada,* Paper 38-16, pp. 35, 36.]

Penny 4, 5, 6, and 7 Fractions, Par, and Uneven Fraction
[3]

The Penny 4, 5, 6, and 7 Fractions, Par, and Uneven Fraction claims are held by Joseph and Elizabeth Wendle, of Barkerville. They are on Peter Gulch and extend downstream on the northeast side of the creek from the Uneven Fraction at the mouth of Copper Creek. These claims are relocations of others which formerly constituted the Cariboo Thompson (Rand) property and which were described by Lang in Geological Survey of Canada Preliminary Paper 38-16, pages 24 to 26, under Wendle group.

The claims are underlain by lower and middle Snowshoe quartzite in the northeastern overturned limb of the Snowshoe syncline.

The main showings are gold-bearing quartz veins on the Par and Uneven Fraction claims. The lower hillside downstream from Copper Creek has been prospected by twelve ground-sluice cuts, each about 300 feet long. These cuts have exposed several quartz veins, of which one about 200 feet east of the northeast corner of the Cunningham Extension No. 1 (Lot 5908) has received most attention. The vein strikes north 5 degrees west and occupies a shear in basal Snowshoe grit and pea-pebble conglomerate. Striations on the walls of the shear plunge 20 degrees north. A drift, the Coniagas adit, was driven along the vein for 110 feet, and at 35 feet from the portal a winze was sunk to a depth of 26 feet. In the drift, from records of work done, the vein averages 1.7 feet wide, and the average of thirty-two assays is 1.3 ounces of gold per ton (sampling by Island Mountain Mines Company Limited).

In January, 1937, a shipment to the Trail smelter of 3.9875 tons of cobbed ore from the vein assayed 7.63 ounces of gold per ton and 2.6 ounces of silver per ton. It is reported by Stevenson† that this shipment contained about 500 pounds of scheelite. In the autumn of 1938, 9.9615 tons of cobbed ore shipped to the Department of Mines sampling plant at Prince Rupert assayed: Gold, 3.71 oz. per ton; silver, 1.25 oz. per ton; and arsenic, 7.1 per cent. About 8 tons of this shipment came from the vein in the Coniagas adit and winze, and the remainder, of about 2 tons, was from a vein on the west side of Peter Gulch about 150 feet west of the portal of the Langley adit.

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* *Geol. Surv., Canada,* Paper 38-16, p. 35.

† *B.C. Dept. of Mines,* Bull. 10 (Rev.), 1943, p. 90.

The portal of the Langley adit is about 60 feet lower in elevation than and about 50 feet west of the northeast corner of the Cunningham Extension No. 1 (Lot 5908). It consists of a crosscut driven south 60 degrees east 325 feet to the vein and 130 feet of drifting on the vein. The portal of this adit is caved.

In 1946 Cariboo-Hudson Gold Mines (1946) Limited held an option on the claims and drilled fourteen diamond-drill holes totalling 2,557 feet without encouraging results.

The other principal gold showing is a small northerly striking vein near the mouth of Copper Creek. The vein strikes north 10 degrees east and occupies a shear in Snowshoe argillaceous quartzite and grit. The shear dissipates itself along fractures paralleling the foliation planes. The quartz is stripped for about 75 feet on the west side of Copper Creek and is mineralized with pyrite and some scheelite. On the east side of the creek the vein is followed by a drift for a short distance in an adit now caved. Pyrite in the vein is irregularly distributed and the gold content is low.

A 6- to 10-inch northerly striking vein is exposed in a ground-sluice cut parallel to and about 150 feet west of Copper Creek. A selected sample containing about 50 per cent pyrite assayed: Gold, 0.36 oz. per ton.

[References: *B.C. Dept. of Mines,* Bull. No. 10 (Rev.), 1943, pp. 90–92. *Minister of Mines, B.C.,* Ann. Rept., 1938, pp. B 36, C 47; 1940, p. 57; 1943, p. 78. *Geol. Surv., Canada,* Preliminary Paper 38-16, pp. 23–26.]

Skarn Nos. 1 and 2
[4]

The Skarn Nos. 1 and 2 mineral claims are held by Dan Jorgenson and W. E. Thompson, of Barkerville. The claims cover scheelite showings on Copper Creek near the twin bridges and a newly discovered tetrahedrite-bearing quartz vein to the north. Some of the scheelite showings were described under Rand (Cariboo Thompson) by Stevenson in British Columbia Department of Mines Bulletin No. 10 (Revised), 1943, pages 90 to 92.

The contact between the Midas and Snowshoe formations crosses Copper Creek below the bridges. In this vicinity the upper Midas black limestone is overlain by Snowshoe quartzite and all rocks are closely and repeatedly folded so that the same limestone bed outcrops as a number of parallel ribs. The Copper Creek fault, inferred because of the lateral displacement of the Midas-Snowshoe contact, is believed to cross Copper Creek about 650 feet downstream from the forks of the creek.

The showings are exposed naturally and in open-cuts along Copper Creek. They extend about 200 feet upstream and 600 feet downstream from the eastern of the twin bridges. They are in Midas rocks on the east side of the Copper Creek fault.

There are several showings above the bridge on the south branch of Copper Creek. An open-cut in black slate on the east side about 200 feet above the bridge exposes narrow quartz stringers across a width of 16 feet. Some copper stain is evident, and scheelite, which is light coloured and not readily seen otherwise, is visible under ultraviolet light. The best scheelite mineralization occurs on the footwall side of the zone and is estimated to contain about 3 per cent tungstic oxide across a width of about 3 feet.

The zone of quartz veins apparently crosses to the west side of the creek and outcrops about 50 feet downstream from the bridge, but at that point contains no scheelite.

On the west side of the creek and upstream from the bridge several open-cuts expose vein quartz as much as 30 inches wide occupying shears which partly cut the foliation and are partly parallel to it. The quartz is irregularly mineralized with scheelite.

On Copper Creek 150 feet downstream from the forks a rib of black limestone is cut by a shear which strikes north 10 degrees west and which has a right-hand displacement of a few feet. The shear is occupied by 3 to 4 feet of vein quartz, and the limestone walls are well mineralized with scheelite. This showing was discovered by Stevenson in 1942 and is described* by him as follows:—

> An open-cut has been driven south-easterly for 6 feet to a face 6 feet high. The cut exposes a compound quartz zone 42 inches wide which consists of 2 lenses of quartz striking north 10 degrees west and dipping 65 degrees eastward. The hangingwall-lens is 1 foot wide and the footwall-lens is 16 inches wide. They are separated by 14 inches of badly crushed, graphitic schist. The hanging-wall is grey, talcose schist, strike north 50 degrees west and about vertical, but the footwall is grey, massive limestone. The mineralization in these lenses consists of quartz, scheelite and small amounts of tetrahedrite, galena and sphalerite. Most of the scheelite in the zone is in the footwall-limestone immediately adjacent to the vein-wall. Here the scheelite occurs as high-grade patches of mineral measuring up to 4 feet by 16 inches in surface area, but probably only a few inches in thickness. Insufficient work has been done to determine the continuity of these patches northerly along the strike of the zone. Smaller amounts of scheelite occur as ribbons of discontinuous grains in and near the foot-wall of the footwall-lens.
>
> A gouge seam, 1 inch thick, lies in the hanging-wall of the hangingwall-lens. The gouge and the abundant crushed rock within the zone indicate much post-mineral movement. The strike of the schist and its position relative to the limestone suggest that the west side of the zone has moved northerly.
>
> The following samples were taken on the showing:—

	Tungstic Oxide (Per Cent)
Footwall-lens—	
3 feet from floor; 16 inches wide	0.2
5 feet from floor; 14 inches wide	Trace
Footwall-limestone—	
1 foot from floor; across 14-inch patch of mineralization, vertical	12.6
1 foot from floor; across 14-inch patch of mineralization, horizontal	18.2

One hundred and twenty-five feet farther down the creek another rib of black limestone is cut by a northerly striking shear having a left-hand displacement of about 10 feet. The shear contains small amounts of scheelite and purple fluorite.

Three hundred feet farther down the creek, near some diabase dykes, several narrow veins mineralized with tetrahedrite cross the creek.

A quartz vein is exposed by trenching and open-cuts on the north side of the road between the two Copper Creek bridges. The vein is 18 to 30 inches wide and is continuously exposed for 80 feet in a trench between the road and the east fork of the creek. It occupies a northerly striking shear. The quartz is mineralized with pyrite, tetrahedrite, and scheelite. A 30-foot length of vein 12 to 18 inches wide is exposed on the north side of the creek. The vein crosses a bed of limestone, but the amount of scheelite in the vein is no greater between limestone walls. The limestone is replaced across a narrow width by pyrite, of which a selected sample assayed: Gold, trace. On the south side of the creek a wedge-shaped horse of quartzite splits the vein where it has a maximum width of 4 feet. The vein at this point is estimated to contain about 3 per cent tungstic oxide.

Ninety feet farther downstream another northerly striking vein 6 to 18 inches wide is sparsely mineralized with tetrahedrite and scheelite.

During the summer of 1951 Dan Jorgenson discovered a new vein about 500 feet north of the bridge across the northern branch of Copper Creek. The vein strikes about north 40 degrees east and is exposed in two open-cuts 35 feet apart. About 75 feet farther uphill a band of limestone outcrops along the hillside. The lower open-cut exposes 14 feet of quartz mineralized with pyrite, galena, sphalerite, tetrahedrite, and very small amounts of scheelite. A selected sample well mineralized with tetrahedrite assayed: Silver, 62.4 oz. per ton.

[Reference: *B.C. Dept. of Mines,* Bull. 10 (Rev.), 1943, pp. 90–92.]

Snowshoe Gold Mines Limited
[16]

Snowshoe Gold Mines Limited, Room 209, 602 Hastings Street West, Vancouver, owns Lots 11332 to 11346. These fifteen Crown-granted claims are near the head of Luce Creek on the north side of the valley, due north of Yanks Peak. They were formerly known as the Jane group. On their eastern side they adjoin the Jim group, and on the southeast the Midas.

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* ***B.C. Dept of Mines,*** **Bull. No. 10 (Rev.), 1943, pp. 91, 92.**

In 1862 a quartz vein was discovered on ground which is now included in the Old Timer (Lot 11337). This, the first quartz vein found in the Keithley Creek district, was discovered by Thomas Haywood and Edward Jeffrey, who named it the Douglas vein. It is so named on Bowman's map of Little Snowshoe and Keithley Creeks. Later it has been known as either the Haywood vein or the Arrastre vein. Bowman records* that Haywood drove a 90-foot adit to tap the vein below its outcrop and that an arrastre built on the ground was unprofitably worked by William Luce on quartz from the vein. In 1886, after Haywood's death, the ground was relocated by Veith and Borland, who cleaned out the old adit and shipped some quartz for a test. There is no record of work having been done for many years after 1887. The claims lapsed in the interval and were relocated by R. Reinhold in 1928. In 1933 the group was under option to Island Mountain Mines Company Limited, for which Reinhold drove a short adit on the south side of Luce Creek near the northeast corner of the Betty Fraction (Lot 11334). Reinhold and partners optioned the Jane group to F. M. Wells, who in 1937 organized Snowshoe Gold Mines Limited. The company built a camp and in 1938 began underground exploration which continued into 1939. The property was idle in 1940, and in 1941 Pioneer Gold Mines of B.C. Limited took an option on the property and did some underground exploration. Work by the Pioneer company ceased in January, 1942, and since then no further work has been done.

The claims are in part underlain by the dominantly argillaceous rocks of the Midas formation and by conglomerate and grey quartzite of the Snowshoe formation. A contact between Midas formation on the west and Snowshoe formation on the east trends in a northwesterly direction through the northeast corners of the Old Timer (Lot 11337) and the Junior Fraction (Lot 11336).

On the Old Timer, Jane (Lot 11338), Bertha (Lot 11332), and Indian Broom (Lot 11333) claims, the rocks are Midas argillaceous and grey sericitic schist, locally with thin interbeds of quartzite and black silty quartzite. Upper Midas black silty quartzite outcrops between the northwest corner of the Old Timer and the northeast corner of the Junior Fraction. It is repeated many times by close isoclinal folding about essentially horizontal axes.

The Midas rocks are involved in rather complex folding, whose details are not definitely known. The anticline just east of Aster B may extend southward through the central part of the Bertha claim, and the anticline at Breakneck Ridge may project through the western part of the Indian Broom claim, but lack of outcrops makes it impossible to verify their presence. The intricacies of the smaller structures within the dominantly incompetent Midas formation remain largely conjectural, but they are thought to be comparable to those studied in detail on the Midas claims. Insufficient outcrops of marker beds prevent detailed structural interpretations being made and prevent correlations between rocks exposed on surface and in underground workings.

An anticline, which brings a 200-foot band of upper Midas black silty quartzite to the surface, lies along the eastern side of the Little Robert (Lot 11340) and Junior (Lot 11341). The Snowshoe rocks lying to the east and west of this anticline occupy a complex belt in which narrow ribbons of basal and lower Snowshoe alternate with ribbons of upper Midas black silty quartzite or ankeritic rocks.

Float from a rhyolite porphyry dyke extends in a line uphill northwestward from the road at a point about 600 feet east of the northeast corner of the Old Timer. An outcrop about 150 feet long and 50 feet wide of altered diorite lies at 5,700 feet elevation on the ridge-top 300 feet east of the northeast corner of the Junior Fraction. These are the only known intrusive rocks on the property.

A wide fault zone is exposed in the bank just west of the portal of the Camp adit, in the Intermediate adit about 40 feet from the portal, and in the Lower adit 130 feet from the portal. This fault strikes a few degrees west of north and dips about 60 degrees to

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* *Geol. Surv., Canada*, Ann. Rept., (1887–88), Vol. III, Pt. I, Pt. C, p. 44c.

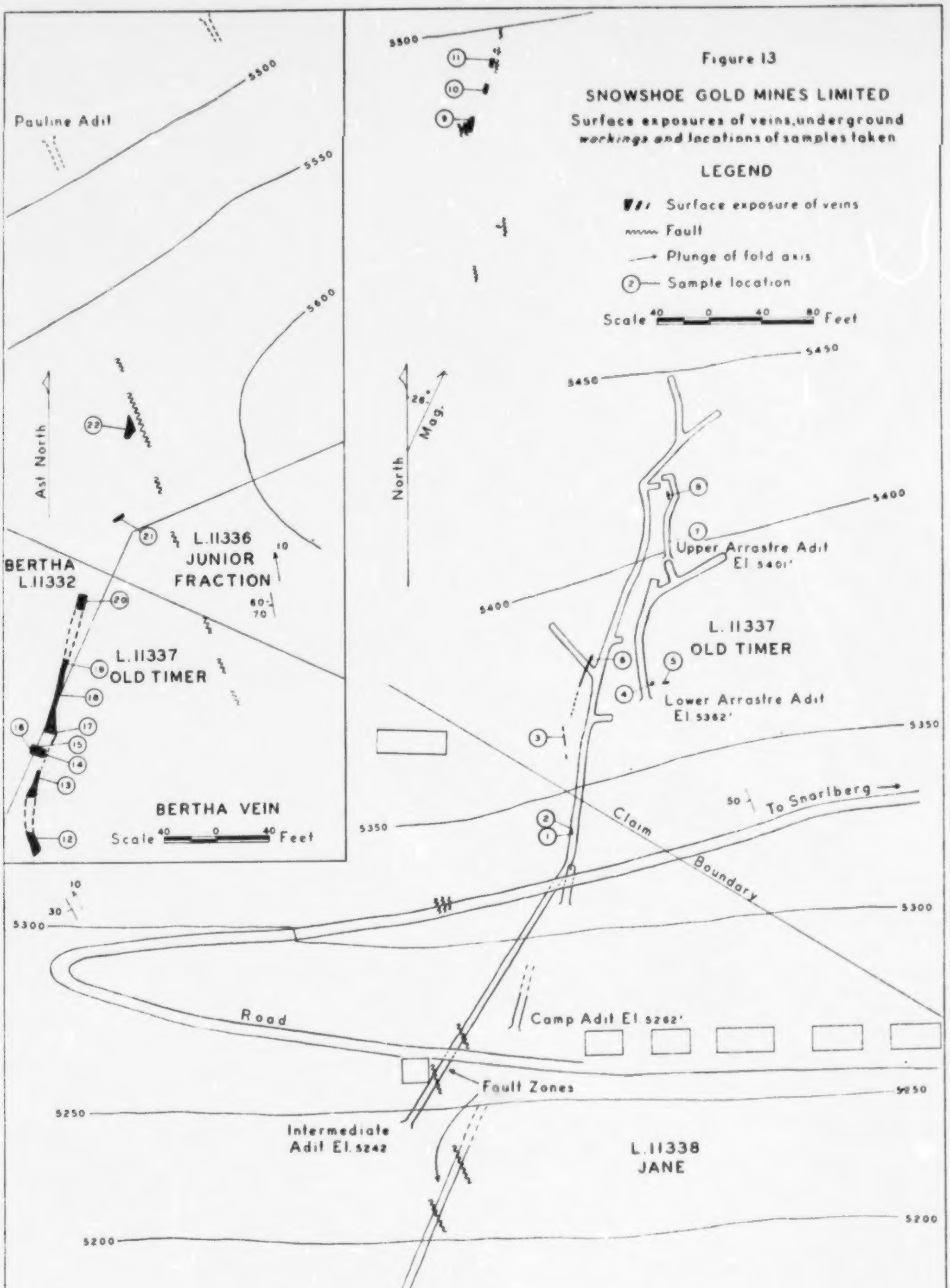

Figure 13

SNOWSHOE GOLD MINES LIMITED

Surface exposures of veins, underground workings and locations of samples taken

LEGEND
Surface exposure of veins
Fault
Plunge of fold axis
② Sample location
Scale 40 0 40 80 Feet
North
Mag.
26°
Ast North
Pauline Adit
L.11336 JUNIOR FRACTION
BERTHA L.11332
L.11337 OLD TIMER
BERTHA VEIN
Scale 40 0 40 Feet
Upper Arrastre Adit El. 5401'
Lower Arrastre Adit El. 5362'
Claim Boundary
To Snarlberg
Road
Camp Adit El. 5262'
Fault Zones
Intermediate Adit El. 5242
L.11338 JANE
Lower Adit El. 5148'
Note: Camp and Lower Adit levels not shown completely
5500
5550
5600
5450
5400
5350
5300
5250
5200
5150
10
60-70
50
30
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

the southwest. Another fault, strike unknown, but possibly slightly west of north, was encountered at the face of the Intermediate adit.

The main surface workings are on the Jane, Old Timer, and the Bertha (*see* Fig. 13). The workings are in two separate areas; one area includes the veins which constituted the first discovery and are on the Jane and Old Timer close to camp, and the other, lying about 1,200 feet to the north, includes several veins on the Bertha.

The trenching and stripping around the principal showing was done mainly by Fred Wells for Snowshoe Gold Mines Limited. Pioneer Gold Mines of B.C. Limited, during their short period of operation, bulldozed a single strip straight uphill but did little stripping to the side of it. The cuts are now partly sloughed and the veins are imperfectly exposed in them, but it is reasonably certain that several quartz veins are present and several others are indicated.

Open-cuts on the west side of the bulldozed strip expose a northerly striking vein for a length of about 150 feet. The vein probably extends south as far as a short adit which passes beneath the road but which is now caved. This evidently is the same northerly striking vein that is followed by the Camp and Intermediate adits. Near the northern end of the vein and exposed in the bulldozed trench is a short lens of quartz as much as 3 feet thick, trending slightly east of north and separate from the first vein.

East of the bulldozed trench and extending southward from the upper Arrastre adit is a narrow quartz vein whose full length is not exposed. This vein probably is the original Douglas vein discovered by Haywood. Several old surface cuts on it are caved and the southward continuity of the vein cannot be seen. The upper Arrastre adit, at 5,401 feet elevation, is 62 feet long and is driven in a northerly direction on the Douglas vein. The rock exposed in it is light, biscuit-brown weathering sericite schist, all considerably oxidized and iron-stained because the adit is only a few feet below the surface. The vein, 24 to 30 inches wide, is exposed for 12 feet south of the portal and for 10 feet within it. Beyond, the adit follows a small northerly striking fault, but there is no vein along it. Instead, quartz stringers a few inches wide, striking mostly north 70 degrees east and dipping 75 degrees northwest, extend laterally from the fault and cross the drift obliquely. The stringers are mineralized with pyrite, and visible gold is present in some. The pyrite is thoroughly oxidized and in many veins is leached, leaving small cubical pits.

The lower Arrastre adit, elevation 5,362 feet, is 120 feet south of the upper Arrastre adit. The portal is caved and the workings are inaccessible. However, a survey of them was made in September, 1940, by B. T. O'Grady, and the following information is derived from his notes. The adit comprises about 160 feet of workings consisting of a northerly drive of about 90 feet and a branch to the northeast about 60 feet in length. At 50 feet from the portal there is a raise to the surface, beyond which the adit follows a northerly striking vein for 30 to 40 feet. Vein quartz in the face is about 5 feet wide. The northeasterly striking branch follows a vein which pinches out about 35 feet from the intersection.

It is possible that the northerly striking vein in the face of the lower Arrastre adit is the same as that in the outer part of the upper Arrastre adit.

Old arrastre tailings are partly covered by the dump of the lower Arrastre adit. It is apparent that very little vein quartz was milled, other than the amount broken in driving the two adits. There is no stoping in the upper adit, and O'Grady indicates that not more than 15 square feet of vein area could have been stoped in the lower adit. None of the assays suggests that the average grade of the vein quartz is sufficiently rich for profitable milling by arrastre. Evidently the same conclusion was reached through experience by Hayward and Luce. About 100 feet east of the portal of the lower Arrastre adit are the remains of an arrastre which was never operated. The other is buried beneath the dump.

Three adits—the Camp adit, Intermediate adit, and Lower adit—totalling about 1,850 feet were driven by Snowshoe Gold Mines Limited in 1938 and 1939 and by Pioneer Gold Mines of B.C. Limited in 1941. The same northerly striking vein that is exposed in surface trenches on the west side of the bulldozed strip is followed on both the

Camp and Intermediate levels. The northerly striking fault, accompanied by some vein quartz that crosses the Lower adit about 460 feet from the portal, is probably the same vein.

The Intermediate and Lower adits cross a strong fault zone about 30 feet wide. This fault strikes a few degrees west of north and dips about 65 degrees west. It is seen only in the underground workings; neither its extension beyond them nor its surface expression has been observed.

The Camp adit, at 5,262 feet elevation, is driven in a northerly direction for about 240 feet. The rocks are mostly medium-grey soft argillaceous schists; some pale sericite schist appears near the face. The dominant schistosity dips steeply northeast and is crossed by a more widely spaced cleavage of a second generation dipping about 25 degrees northeast. About 80 feet from the portal, vein quartz reaching a maximum width of 16 inches and striking about 20 degrees east comes in from the west wall and is followed by the adit for about 75 feet. At that point the vein joins a northerly striking fault, strike north 5 degrees west and dip 70 degrees east, of very small displacement. Vein quartz 18 to 22 inches wide follows along the fault for about 60 feet, at which point the vein appears to swing into the east wall. Striations on the smooth wall of quartz in the fault plunge 15 degrees south. The post-vein movement along the northerly fault displaces veins about 2½ feet to the right. The quartz is mineralized with pyrite and a small amount of galena. Assays of samples are listed in the tabulation on page 84. From them it is apparent that higher gold values accompany the more abundant pyrite mineralization. The veins occupy a single northerly striking fault of small displacement and associated tension fractures striking about north 40 degrees east. The contemporaneity of quartz mineralization is shown by the merging of the small northeasterly striking veins with the larger northerly striking one.

The Intermediate adit, at 5,242 feet elevation, comprises about 700 feet of workings beneath the Camp adit. Most of the rocks are dark argillaceous schists which display a moderate to steep southwest-dipping schistosity and a gentle northeast-dipping fracture cleavage. A bed of ankerite rock is involved in some small-scale folding east of the fault zone near the portal. The fault zone on this level has a width of 35 feet and crosses the adit 40 feet from the portal. The fault dips about 45 to 60 degrees west, and small flutings along minor shear planes within it plunge gently southward, parallel to the striations on the vein wall in the Camp and Intermediate adits.

About 225 feet from the portal a 6- to 8-inch quartz vein comes in on the east wall of the adit, expands to a maximum width of 24 inches, and occupies a well-defined northerly trending fault for about 150 feet. The vein is sparingly mineralized with pyrite and corresponds with the northerly striking segment in the Camp adit about 20 feet above. At the northern end of the quartz a narrow fracture branches to the northeast, and although the fault continues northward, no quartz appears along it. The northerly striking fault is crossed by an easterly striking fault dipping 20 degrees south which displaces it about 3 feet to the right.

Beyond the north end of the northerly striking vein, scores of narrow quartz veins, all striking about north 60 degrees east, cross the adit. Most of these veins contain little or no pyrite. High gold assays are obtainable from a narrow vein, well mineralized with pyrite, on the east wall opposite the first crosscut to the left, about 380 feet from the portal. The average of eleven samples taken by Pioneer Gold Mines of B.C. Limited along 30 feet of drift in this vicinity was about 0.3 oz. gold per ton.

The Lower adit is at 5,148 feet elevation and is driven 650 feet at north 23 degrees east. From it 360 feet of drifts and crosscuts have been driven. The rocks exposed in it are dark argillaceous schist, black slate, and pale biscuit-coloured sericite schist, and black slate and quartzite at the innermost end. A bed of ankerite rock probably is the same one that appears in the upper levels. The rocks show two sets of cleavage, with the gently dipping second-generation set fairly prominent.

A fault zone 40 feet wide crosses the adit 130 feet from the portal. The zone strikes about north 25 degrees west, dips 65 degrees to the southwest, and appears to be more or less parallel to the beds.

At 260 feet from the portal a vein striking north 75 degrees east crosses the adit and is followed for 90 feet to the northeast before the fracture disappears. The vein has a maximum width of 10 inches and is poorly mineralized.

At 450 feet from the portal a northerly striking fault, with some quartz along it and with striations plunging 15 degrees south, comes in on the east wall and crosses to the west side of the adit. It reappears in a crosscut driven west 550 feet from the portal. This mineralized fault is probably the same one that has been followed in the upper levels. On this level it appears less well mineralized with quartz. Beyond this vein numerous quartz-filled fractures only a few inches wide and striking about north 60 degrees east cross the adit. This fracture direction is fairly constant throughout the underground workings. It is believed to represent the direction of tensional release associated with shearing along the northerly striking faults (*see* Figs. 5 and 6).

Two other veins lying to the north of the principal showings have been partly exposed by stripping (*see* Fig. 13). One vein reaches a maximum width of 8 feet in trenches at about 5,490 feet elevation and 80 feet northwest of the north end of the bulldozed strip. This vein is exposed for a length of about 80 feet. Samples numbered 9, 10, and 11 on page 84 are from it.

The other vein is well exposed for a length of at least 200 feet at 5,570 feet elevation in the northwest corner of the Old Timer and the northeast corner of the Bertha (*see* Fig. 13). This vein strikes about north 15 degrees east and ranges in width from 3 to 7 feet. The vein quartz is little fractured and is very sparsely mineralized. Samples numbered 12 to 20 on page 84 are from this vein.

In 1933 Reinhold drove a short adit on the south side of Luce Creek 75 feet west of the southwest corner of the Indian Broom claim. The adit is now caved. Quartz on the dump is sheared and crushed, and some is mineralized with pyrite. A sample taken by Lay* assayed: Gold, 0.32 oz. per ton. Lay states that the vein is parallel to the strike but not to the dip of the enclosing dark argillaceous schist and black quartzite. A selected sample of well-mineralized quartz from the dump assayed: Gold, 0.15 oz. per ton.

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* *Minister of Mines, B.C.*, Ann. Rept., 1933, p. 137.

TABULATION OF ASSAYS FROM SNOWSHOE SURFACE WORKINGS

(Sample locations are marked on Figure 13.)

Sample No. on Fig. 13	Width		Description	Gold	Silver
	Ft.	In.		Oz. per Ton	Oz. per Ton
1	—	—	West vein—washings from panning quartz fragments with limonite in cavities and specks of galena	0.93	0.1
2	0	10	West vein—fractured quartz with limonite in vugs and rare specks of galena	1.07	0.1
3	1	7	West vein—ribboned quartz with about 2 per cent pyrite	0.44	*Nil*
4	2	6	Lower Arrastre adit—quartz with scattered ankerite and some pyrite	*Nil*	*Nil*
5	2	8	Lower Arrastre adit—fractured quartz with ankerite along walls	0.01	*Nil*
6	3	2	Bulldozed strip—quartz with rare limonite-filled vugs	0.01	*Nil*
—	—	—	Upper Arrastre adit—selected quartz from dump with 5 per cent pyrite and galena	1.86	1.1
7	2	6	Upper Arrastre adit, Douglas vein in floor of adit—fractured quartz with about 2 per cent pyrite	0.29	*Nil*
8	1	1	Douglas vein zone—fractured quartz with minor pyrite near walls	0.02	Trace
9	4	4	First vein northwest of principal workings—fractured quartz with some ankerite and pyrite	*Nil*	*Nil*
10	3	4	First vein northwest of principal workings—fractured quartz with some ankerite and no pyrite	0.01	*Nil*
11	3	4	First vein northwest of principal workings—massive quartz with some ankerite and no pyrite	0.01	Trace
12	7	0	Bertha vein—quartz with unreplaced wallrock, iron-stained	0.09	*Nil*
13	3	9	Bertha vein—massive quartz with fragments of wallrock and some fine-grained pyrite	*Nil*	*Nil*
14	4	6	Bertha vein—quartz with fragments of wallrock and rare grains of pyrite	0.02	*Nil*
15	3	2	Bertha vein—quartz with fragments of wallrock	*Nil*	*Nil*
16	3	6	Bertha vein—quartz ribboned with black argillite	*Nil*	*Nil*
17	8	0	Bertha vein—massive quartz with some fragments of wallrock	0.01	*Nil*
18	2	8	Bertha vein—massive quartz with some fragments of wallrock	0.02	*Nil*
19	3	2	Bertha vein—massive quartz with no mineralization evident	0.01	*Nil*
20	7	0	Bertha vein—quartz with fragments of wallrock	0.01	*Nil*
21	9	0	Bertha vein—fractured quartz slightly iron stained	*Nil*	*Nil*
22	6	0	Bertha vein—fractured quartz slightly iron stained	*Nil*	*Nil*
	—	—	Mineralized quartz boulder from Luce (Minicci) hydraulic pit—20 per cent pyrite and much galena	0.26	2.9
	—	—	Mineralized quartz boulder from Luce (Minicci) hydraulic pit—15 per cent pyrite, 3 per cent galena	0.12	2.4

TABULATION OF ASSAYS FROM CAMP ADIT

Width		Distance from Portal	Description	Gold	Silver
Ft.	In.	Ft.		Oz. per Ton	Oz. per Ton
	—	—	Selected sample from dump containing 40 per cent pyrite	7.31	0.7
0	10	79	Quartz with about 10 per cent pyrite	0.79	*Nil*
0	11	106	Fractured iron-stained quartz, sparse pyrite	0.06	*Nil*
	—	104	Well mineralized quartz, 25 per cent pyrite	2.29	*Nil*
	—	109	Quartz mineralized with 15 per cent pyrite and some galena	0.17	0.1
0	10	124	Fractured iron-stained quartz, about 2 per cent pyrite	0.02	*Nil*
1	4	144	Fractured iron-stained quartz, sparse pyrite	0.03	*Nil*
1	2	163	Fractured quartz, rare pyrite grains	0.01	*Nil*
1	10	196	Fractured quartz with minor pyrite and several grains of sphalerite	0.02	*Nil*
	—	196	Quartz mineralized with pyrite, galena, and sphalerite totalling less than 5 per cent	0.04	Trace
		204	Selected quartz with 30 per cent pyrite	1.39	Trace
1	8	204	Fractured quartz with less than 1 per cent pyrite	0.12	*Nil*

TABULATION OF ASSAYS FROM INTERMEDIATE ADIT

Width		Distance from Portal	Description	Gold	Silver
Ft.	In.	Ft.		Oz. per Ton	Oz. per Ton
1	0	230	Fractured quartz with some pyrite	0.15	*Nil*
0	10	234	Ribboned quartz with some pyrite	0.04	*Nil*
1	6	264	Crushed quartz with ribbons of wallrock and pyrite	0.15	*Nil*
1	3	277	Fractured quartz with ribbons of wallrock and some pyrite	0.30	0.1
0	10	319	Quartz with rare specks of pyrite	0.14	*Nil*
—	—	330	Selected sample with coarse- and fine-grained pyrite	2.26	Trace
1	10	349	Quartz with ribbons of wallrock and some pyrite near walls	0.20	*Nil*
—	—	381	Selected quartz with two-thirds pyrite	4.14	0.1
—	—	381	High-grade stringer with 50 per cent pyrite	4.67	2.5

TABULATION OF ASSAYS FROM LOWER ADIT

Width		Location	Description	Gold	Silver
Ft.	In.			Oz. per Ton	Oz. per Ton
0	8	260 ft. from portal on left side	Quartz with scattered ankerite and rare pyrite	*Nil*	*Nil*
0	11	Drift 260 ft. from portal, 5 ft. from crosscut	Quartz with minor ankerite and some pyrite	*Nil*	*Nil*
0	6	22 ft. from crosscut	Fractured iron-stained quartz with some pyrite	Trace	*Nil*
0	9	44 ft. from crosscut	Quartz with 5 per cent ankerite and no pyrite	0.01	*Nil*
0	10	62 ft. from crosscut	Massive quartz with ankerite along walls	*Nil*	*Nil*
1	2	78 ft. from crosscut	Fractured quartz, minor ankerite, and rare pyrite	*Nil*	*Nil*
1	0	450 ft. from portal	Fractured quartz with inclusions of wallrock and some pyrite	0.24	*Nil*
0	9	470 ft. from portal	Fractured quartz with some pyrite	0.12	0.1
1	0	480 ft. from portal	Quartz with rare pyrite grains	0.01	*Nil*
1	6	505 ft. from portal	Sheared quartz and wallrock with some pyrite	0.12	*Nil*
1	6	525 ft. from portal	Sheared wallrock with quartz stringers	0.06	0.1
0	9	550 ft. from portal	Quartz with ribbons of wallrock, minor pyrite	0.04	*Nil*
—	—	Drift 260 ft. from portal, 5 ft. from crosscut	Selected sample with 50 per cent pyrite	*Nil*	*Nil*

[References: *Minister of Mines, B.C.*, Ann. Rept., 1929, p. 194; 1933, p. 139; 1938, p. C 47; 1939, p. 71; 1940, p. 57; 1941, p. 56; 1942, p. 55. *Geol. Surv., Canada*, Paper 38-16, pp. 36–38.]

Sockett Showing
[23]

Two claims located in 1946 and named the Number One and Number Two are held by James Sockett, of Beaverdell. They are on French Snowshoe Creek where the Yanks Peak quartzite crosses the creek. The showing is on the south side of the creek and is reached by a foot-trail from Larsen's old cabin on the south side of the road about 4,000 feet southwest of Snarlberg.

A discovery of mineralization was made in the Yanks Peak quartzite where it crosses French Snowshoe Creek at about 4,350 feet elevation. The quartzite is exposed naturally in the creek bottom and by two large open-cuts on the south side, and appears in natural exposures uphill to both north and south, but no mineralization has been found other than in the creek showing.

The Yanks Peak quartzite is about 80 feet wide where it crosses the creek. It strikes north 35 degrees west and dips 60 degrees southwest. It is crossed by numerous narrow quartz stringers a few inches wide, striking north 60 degrees east and dipping vertical, which have silicified the adjoining quartzite to a dense fine-grained white aggregate. The stringers are mineralized with pyrite, galena, and sphalerite. The presence of chalcopyrite and tetrahedrite has been reported by the owner but is not confirmed. A small amount of mineralization is disseminated through the silicified quartzite. Some selected samples taken by the owner are reported by him to have assayed as much as 0.70 to 0.90 ounce of gold per ton. Three samples of selected, well-mineralized quartz assayed: Gold, 0.06 oz., trace, and *nil* per ton.

The Stockwork [13]

The Stockwork consists of a group of quartz veins at an elevation of about 5,850 feet, about 3,000 feet north of the Jim adit and about 2,800 feet south of the Cornish Ledges. It is on ground held by Lieut.-Col. F. H. M. Codville, of Duncan. The veins are in grey quartzite of the Snowshoe formation and occupy an area about 300 feet square just west of the western contact of a narrow band of Midas black silty quartzite. The vein area is on the western flank of a northeasterly dipping anticlinal septum of Midas rocks.

The veins are exposed in shallow surface workings and natural outcrops. They are in rocks striking about north 30 degrees west and dipping gently northeast. Lineation in the Midas formation just east of the vein area plunges 15 degrees to the northwest.

Quartz veins occupy several sets of fractures. The most prominent fracture direction strikes about north 50 degrees east, and less conspicuous fracture directions strike about north 25 degrees east and due east. Vein quartz parallel to the schistosity of the rocks joins the northeasterly striking veins and in so doing tends to form a rather complex pattern. Some of the veins attain a width of 12 feet and several are 3 to 6 feet wide. The amount of quartz in this small area is quite impressive. However, in most exposures the quartz is barren or only sparsely mineralized. One vein near the western side of the area is well mineralized with galena, sphalerite, and pyrite. From it three samples of selected material were taken. One containing galena and no pyrite or sphalerite assayed: Gold, 0.01 oz. per ton; silver, 7.8 oz. per ton; and lead, 20.5 per cent. One containing sphalerite and some pyrite but no galena assayed: Gold, 0.01 oz. per ton; silver, 0.1 oz. per ton; and zinc, 1.3 per cent. One containing about 20 per cent pyrite and no galena or sphalerite assayed: Gold, *nil.*

[References: *Minister of Mines, B.C.,* Ann. Rept., 1929, p. 195. *Geol. Surv. Canada,* Paper 38-16, p. 34.]

Taylor Tungsten [9]

Scheelite was discovered by B. E. Taylor, of Wells, about 1,000 feet north of the underground workings on the Hebson vein. The scheelite showings are at 5,900 feet elevation on ground sloping gently westward into the head of McMartin Creek. The veins are in grey quartzites of the Snowshoe formation striking north 30 degrees west and dipping about 45 degrees to the southwest. They are about 700 feet west of the axis of an anticlinal septum of Midas black silty quartzite, the Breakneck anticline which encloses the Hebson vein. The Snowshoe formation lies in a northwesterly plunging syncline whose axial plane is about 1,500 feet west of the workings.

The workings were examined by Stevenson in 1940 at a time when the trenching had been newly done. The following description is from his report in British Columbia Department of Mines Bulletin No. 10 (Revised), 1943, pages 98 to 100:—

> The tungsten occurs in a lenticular quartz-scheelite vein, strike north 60 degrees west and dip 75 degrees south-westward, that ranges in width from 1 inch to 4 inches and is exposed for approximately 18 feet before disappearing into sheared rock. The vein shear cuts fissile quartzites and sericite schists that strike in general north 15 degrees west and dip 50 degrees south-westward; these rocks comprise part of the Richfield [*sic*] formation. In the vicinity of the vein-shear the rocks have been impregnated by small amounts of pyrite and galena.
>
> The workings consist of two trenches and in one of them a shaft. Elsewhere two pits have been dug.
>
> Number 1 trench extends north-westerly for 38 feet. It is 6 to 7 feet wide, 1 to 2 feet deep and towards the middle a shaft 6 feet in diameter and 6 feet deep is sunk.
>
> Number 2 trench, in direction transverse to that of Number 1, lies north-westerly from it. The north-east end of Number 2 trench, extending for 35 feet in a south-westerly direction, is 15 feet north from the north-west end of Number 1. It is 4 feet wide, 6 feet deep at its north-east end and 1 foot deep at its south-west end.
>
> Scheelite was seen only in Number 1 trench.
>
> The vein is a quartz-filled shear that cuts fissile quartzites and sericite schists. Its best exposure is in the north-west face of the shaft in Number 1 working, where the vein is slightly lenticular, ranging from 3 to 4 inches in width and is bordered by ⅛ inch of sheared rock. The vein-matter consists of large, poorly-defined crystals of quartz arranged perpendicularly to the walls of the vein and enclosing patches and crystals of scheelite, its oxidation product tungstite

> and stolzite. A small amount of galena occurs as widely-scattered grains in the adjacent sediments. The amount of scheelite is quite variable, ranging in places from a fraction of a per cent to about 50 per cent of the vein-matter. A representative 30-pound sample taken along the full 4-inch width of the vein and over a 4-foot length in the north-west face of the shaft assayed: Tungstic oxide (WO_3), 26.2 per cent.
>
> The scheelite vein extends south-easterly for 18 feet from the north-west side of the shaft. The writer did not see any scheelite in the last 12 feet of the vein but it is reported to have been found when digging the trench. In a north-westerly direction the vein narrows to a barren shear within a few inches of the side of the shaft, and, as such, disappears under the debris that covers the floor of the trench dug along the projected extension of the vein. Number 2 trench cuts across the projected strike of the vein at a point 30 feet north-westerly from the shaft but does not expose any vein-matter or well defined vein-shear.
>
> The vein appears to cut three earlier bedded quartz veins, barren of scheelite. One of the bedded veins extends along a bedding plane in the sediments for a distance of 3 feet northerly from the scheelite vein. The other two bedded veins extend south-westerly from the scheelite vein for 1 foot along bedding planes of the sediments. These bedded veins appear to have been fed by the fissure now occupied by the scheelite vein. The formation of these bedded veins would therefore have antedated the deposition of the scheelite in the main vein.
>
> A shallow pit has been dug in the banks of a small south-westerly-flowing creek at a point approximately 570 feet north-westerly from Number 1 pit. This working exposes a small amount of galena which occurs as (1) grains in bedded quartz lenses 1 inch thick and 1 foot to 2 feet in length, and (2) as grains disseminated in fissile quartzite adjacent to the quartz lenses. A low percentage of pyrite and sphalerite is associated with the galena.
>
> Fourteen feet upstream from the last pit, another working 6 feet in diameter and 5 feet deep exposes a 2-foot length of a quartz lens 1 foot thick that contains pyrite, marcasite, galena and sphalerite.
>
> The rocks in these two pits are nearly flat-lying, fissile quartzites that appear to strike in a general north-westerly direction and dip 10 degrees south-westward.
>
> Since the property was examined by the writer in July, 1940, two new pits have been sunk 10 feet and 8 feet on the main tungsten showings and it is understood an adit was started late in the season of 1942 to get under these showings. However, the work has so far failed to disclose additional ore.

The adit referred to was driven 90 feet but did not cross any tungsten-bearing vein. It was abandoned at that point and no further work has been done.

[Reference: *B.C. Dept. of Mines,* Bull. No. 10 (Rev.), 1943, pp. 98–100.]

Yanks Peak
[21]

The Yanks Peak group consists of seven Crown-granted claims, Lots 10662 to 10668. The assessed owner is Cariboo Yankee Belle Mining Company Limited, c/o B. G. Hawkins, 424 Standard Bank Building, Vancouver. The claims are on the southwest slope of Yanks Peak and extend in single file from the top of the ridge at 5,800 feet elevation southeastward downhill to French Snowshoe Creek at 4,500 feet elevation.

Veins were found in 1923 by H. Talbot and J. Larsen on the southwest slope of Yanks Peak, and three claims were located in that year. Three other claims were located in 1924. In 1929 a mill of 25 tons capacity was erected near the camp and near the portal of a low-level adit. The Yanks Peak Mining Company Limited was incorporated in January, 1930, to explore the showings. Little work was done until 1933, by which time the property was being worked by Cariboo Yankee Belle Mining Company Limited. This company began in August, 1933, to drive a crosscut to explore the Corban vein zone about 350 feet below its outcrop. The crosscut was driven 1,585 feet when work stopped in 1935. In 1938 the length of the crosscut was increased to 1,643 feet, and no work has been done on the property since. The portal is caved and the workings are inaccessible.

The Yanks Peak claims are underlain by rocks of the Yankee Belle formation, except that the East Yanks Peak No. 2 (Lot 10668) near French Snowshoe Creek is crossed by Yanks Peak quartzite and some Midas rocks. On the upper claims near the Corban showings the rocks are dominantly laminated argillaceous silty quartzites, either grey or brownish weathering, and commonly spotted with porphyroblastic ankerite.

The rocks have a prevailing northwesterly strike and occupy the core of the Yankee Belle anticline, a major fold structure whose isoclinal limbs are about 3,500 feet apart. The Yanks Peak claims straddle and lie to the east of the axis of this anticline. Small dragfolds indicate that the minor details of folding are extremely complex, probably comparable to the internal structure of the Midas formation on the ridge northeast of the peak. The scarcity of exposures and the absence of marker beds make detailed structural mapping very difficult.

Several faults which are to be seen on the north face of Yanks Peak (*see* Plate II (A)) may extend southwest across the claims, but no surface indication of their presence was observed. When the main crosscut was driven, a large fault was encountered about 700 feet from the portal. This fault is reported to strike slightly east of north. Its extension to the north is believed to lie to the east of the surface workings on the Corban vein, but no surface expression of it was observed.

The veins for the most part lie in two main groups. The Corban vein zone is on the Yanks Peak claim (Lot 10662), between 5,575 and 5,725 feet elevation, in an area about 500 feet long and 200 feet wide below the old high-level trail to the Midas camp. The Talbot veins are on the Yanks Peak No. 2 claim (Lot 10663) at about 5,700 feet elevation and are about 1,500 feet northwest of the Corban showings.

The main surface showings are veins in the Corban zone. These veins have been exposed in three adits, two shallow shafts, and two open-cuts (*see* Fig. 14). The adits are caved and the open-cuts partly sloughed so that the veins are not all visible. Actual and inferred positions of the veins indicate that they occupy fractures striking north 50 to 60 degrees east. The zone is believed to lie on the west side of the large fault that was encountered in the long crosscut. Vein quartz as much as 30 inches wide is exposed in some of the workings, and quartz is seen on the dumps of others. The quartz is extremely vuggy and contains numerous large quartz crystals which distinguish it from other vein quartz in the area. Cubical cavities mark the places where pyrite has been weathered from the vein outcrops, and limonitic incrustations in the vugs are common. However, the amount of pyrite mineralization was small, and visible gold was seen in the outcrops of only two veins.

The three adits appear to have been driven on separate veins. From available surveys their lengths are: Lower adit, 148 feet; middle adit, 182 feet; and upper adit, 86 feet. Assays of samples taken in 1950 are tabulated below. The sample locations are shown on Figure 14.

ASSAYS OF SAMPLES FROM CORBAN VEIN ZONE

Sample No. on Fig. 14	Width		Description	Gold	Silver
	Ft.	In.		Oz. per Ton	Oz. per Ton
1	2	6	Brecciated and recemented quartz, partly vuggy; pyrite 3 inches wide near one wall; some visible gold present	0.03	Trace
2	2	2	Massive quartz with small amount of pyrite, small number of vugs	*Nil*	*Nil*
3	2	9	Brecciated recemented quartz, limonite in cement and in vugs	0.08	*Nil*
4	1	4	Massive partly vuggy quartz, rare pyrite, some limonite	0.01	0.2
5	1	6	Fractured partly vuggy quartz, iron-stained, but no visible mineralization	*Nil*	*Nil*
6	1	6	Fractured vuggy quartz with limonite as stains and in vugs	*Nil*	0.3
7	1	8	Fractured slightly vuggy quartz	*Nil*	0.2
8	1	6	Iron stained quartz with ankerite along wall	0.01	*Nil*
9	1	2	Fractured quartz with botryoidal limonite	*Nil*	*Nil*
10	1	8	Fractured vuggy quartz with iron stain	*Nil*	*Nil*

A number of trenches about 200 feet east of the southeast corner of the Yanks Peak claim expose some quartz veins whose attitude is not known. These veins probably are on the east side of the fault encountered underground in the long crosscut.

The portal of the long Cariboo Yankee Belle crosscut is 280 feet southeast of the west corner of the Yanks Peak No. 3 claim (Lot 10664) at 5,301 feet elevation. The crosscut has a total length of 1,643 feet and was driven to explore the area below the Corban vein zone. The adit is inaccessible, but a survey made in July, 1935, by C.

Beadon, of London, is shown on Figure 14. A large fault zone, presumed to strike about 10 to 20 degrees east of north, was crossed about 700 feet from the portal. The face of the crosscut is about 380 feet vertically below the Corban vein zone. It is reported* that a large number of veins were crossed, striking from north 33 degrees east to south 80 degrees east and either vertical or dipping steeply southeast. The largest was about 6 feet wide and many were less than 1 foot. The highest assays, reported to be about half an ounce of gold per ton, are said to have been obtained from a 15-inch vein about 685 feet from the portal. One of Beadon's maps indicates that veins 1,510 and 1,512 feet from the portal contained visible gold.

The Talbot showings consist of a number of veins at an elevation of about 5,700 feet in the central part of the Yanks Peak No. 2 claim. The veins are exposed in a shallow shaft and in surface trenches. Most of the veins occupy northeasterly striking fractures. The quartz is extremely vuggy and is sparsely mineralized.

Five samples from the Talbot showings assayed: Gold, *nil* or trace. One of selected pyrite from a vein 100 feet east of the shaft assayed: Gold, 0.55 oz. per ton.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1925, p. 161; 1929, p. 192; 1933, p. 137; 1934, p. C 30; 1938, p. C 48. *Geol. Surv., Canada,* Paper 38–16, pp. 40, 41.]

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* *Geol. Surv., Canada*, Paper 38-16, p. 41.

APPENDICES

APPENDIX A

SURVEYED LOTS ON FIGURE 2, SHEET A, AND CORRESPONDING CLAIM NAMES

4668. Saddle.
4669. Saddle Extension.
4670. Midas.
4671. Midas Extension No. 2.
4672. E. T. Fraction.
4673. Midas Extension No. 1.
4674. A. T. Fraction.
4675. I. B. Fraction.
4676. Fill Fraction.
4677. West Midas Extension No. 1.
4678. Ridge No. 1.
4679. Ridge No. 2.
4680. Ridge No. 3.
4681. Ridge No. 4.
10662. Yanks Peak.
10663. Yanks Peak No. 2.
10664. Yanks Peak No. 3.
10665. Y. P. Fraction.
10666. East Yanks Peak.
10667. Y. P. E. Fraction.
10668. East Yanks Peak No. 2.
11237. Jim.
11238. Pete.
11331. Jane Extension No. 1.
11332. Bertha.
11333. Indian Broom.
11334. Betty Fraction.
11335. Betty.
11336. Junior Fraction.
11337. Old Timer.
11338. Jane.
11339. Old Faithful.
11340. Little Robert.
11341. Junior.
11342. Bella Coola.
11343. Junior Extension.
11344. Grouse.
11345. Jane Extension No. 2.
11346. Tri Fraction.

SURVEYED LOTS ON FIGURE 2, SHEET B, AND CORRESPONDING CLAIM NAMES

3485. International No. 5.
3486. International No. 6.
3487. International No. 7.
3488. International No. 8.
3489. International No. 1.
3490. International No. 2.
3491. International No. 3.
3492. International No. 4.
3493. Dawn Fraction.
3494. Dawn No. 2 Fraction.
3495. No. 1 International Fraction.
3497. Sedan No. 3.
3498. Hub No. 2 Fraction.
3499. Peerless No. 3.
3500. Hub Fraction.
3501. Sedan No. 2.
3502. Peerless No. 2.
3503. Sedan No. 1.
3504. Peerless No. 1.
3505. Sedan No. 4 Fraction.
3506. Sedan No. 5 Fraction.
3507. Federal No. 1.
3508. Peerless No. 4 Fraction.
3509. Federal Fraction.
3510. Surprise No. 2.
3511. Surprise No. 4.
3512. Surprise No. 7 Fraction.
3513. Surprise No. 1.
3514. Surprise No. 3.
5905. Cunningham No. 1.
5906. Cunningham No. 2.
5907. Cunningham No. 3.
5908. Cunningham Extension No. 1.
5909. Cunningham Extension No. 2.
5910. Sidewinder No. 1.
5911. Sidewinder No. 2.
5912. Sidewinder No. 3.
5913. Sidewinder Fraction.
5914. Black Martin No. 2.
5915. Black Martin No. 1.
5916. Black Martin No. 3.
5917. Black Martin No. 4.
5918. Black Martin Fraction.
5920. Roundtop.
5921. Cunningham Fraction.
5922. Tiny Fraction.
9816. Hudson.
9817. Glen Echo.

APPENDIX A—*Continued*

SURVEYED LOTS ON FIGURE 2, SHEET B, AND CORRESPONDING CLAIM NAMES—*Continued*

9818. Fourth of July.
9819. First of July.
9820. Shasta.
9821. Shasta No. 2.
10596. Cutler No. 1.
10597. Cutler No. 2.
10598. Rad Fraction.
10940. Surprise No. 6.

APPENDIX B

CHEMICAL ANALYSES OF CARIBOO ANKERITES

Sample No.	Description	Carbonate in Sample	$CaCO_3$	$FeCO_3$	$MgCO_3$	$MnCO_3$	Remarks
		Per Cent					
551 (3641)	Vein ankerite—from dump of Yankee Belle Crosscut	92.8	50.8	25.0	23.7	0.45	
535 (2539)	Vein ankerite—Snowshoe Intermediate Level at station 6+08	58.5	51.6	35.2	12.5	0.70	
509 (2516)	Vein ankerite—Snowshoe Intermediate Level dump	81.9	55.5	32.5	11.2	Trace	
513 (2520)	Vein ankerite—Midas crosscut	94.4	2.0	87.0	11.0	Trace	
160 (776)	Vein ankerite from quartz vein in Burns Mountain crosscut[1]	55.0	1.4	65.6	29.9	3.20	
512 (3661)	Ankeritic quartzite at head of the second switchback above Snarlberg	55.4	52.5	22.0	25.4	Trace	**Rock is an ankeritized quartzite.**
576 (3665)	Carbonate rock at Midas-Snowshoe contact southwest of Harvey B	76.1	92.3	6.2	1.7	Trace	**Rock is probably a partly ankeritized limestone.**
564 (3653)	Carbonate beds in middle Snowshoe member at head of Cunningham Creek	44.3	53.3	23.5	22.3	0.97	
262 (2713)	Carbonate beds in Canusa Cariboo Gold Mines crosscut	8.3	39.1	36.7	23.7	0.50	
174 (1891)	Ankeritic quartzite from Oregon Gulch	60.6	52.0	6.1	41.2	0.70	**Rock is probably an ankeritized quartzite.**
173 (1757)	Ankeritized rhyolite porphyry from Spanish Mountain[2]	About 20	50.0	21.2	28.8	......	**Rock is an ankeritized rhyolite porphyry.**
...... (4284)	Grey carbonate in Island Mountain replacement ore (" dolomite ")	......	49.7	19.4	24.6	3.80	

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[1] *B.C. Dept. of Mines*, Bull. No. 26, p. 26.

[2] *Minister of Mines, B.C.*, Ann. Rept., 1947, p. 124.

APPENDIX C

FINENESS AND SPECTROCHEMICAL ANALYSES[1] OF LODE GOLDS FROM JIM AND MIDAS VEINS

Sample No.	Description	Fineness	Wave Length														
			2,435.1	2,536.5	3,047.6	2,795.5	2,833.1	3,082.1	2,961.2	2,576.1	3,414.7	3,361.2	4,274.2	3,067.7	2,877.9	3,453.5	3,345.0
			Si	Hg	Fe	Mg	Pb	Al	Cu	Mn	Ni	Ti	Cr	Bi	Sb	Co	Zn
	Jim Vein																
220 (1823)	Gold in quartz	879±1.4	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
221 (1824)	Gold in quartz	870±1.5	2	9	11	9	1	*	3	2	3	3	*	*	*	5	10
222 (1825)	Gold in pannings of crushed quartz	867±0.2	11	1	4	5	3	*	1	*	*	10	5	*	*	*	*
257 (2724)	Gold in and around leached pyrite	861.0	19	4	5	27	48	7	Trace	Trace	*	8	Trace	8	*	*	*
526 (2728)	Pan concentrates from vein +60 mesh	860.9	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
526 (2728)	Pan concentrates from vein −60 mesh	854.7	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
527 (2729)	Gold from pan concentrates of oxidized quartz +40 mesh	875.02	5	1	19	23	160	Trace	Trace	Trace	*	Trace	Trace	43	Trace	*	*
527 (2729)	Gold from pan concentrates of oxidized quartz −40 mesh	867.75	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
258 (2730)	Gold in and around pyrite cavities	872.5	8	4	26	34	160	4	Trace	Trace	*	7	Trace	*	*	*	*
	Average	867															
	Tait Vein																
234 (1814)	Gold in botryoidal limonite	868±8	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
525 (2727)	Panning from oxidized outcrop +40 mesh	889.0	4	1	10	22	2	3	2	Trace	*	Trace	Trace	*	*	*	*
525 (2727)	Panning from oxidized outcrop −40 mesh	890.0	2	2	21	34	*	3	3	1	*	26	Trace	*	*	*	*
543 (2547)	Gold from vein outcrop +60 mesh	883.2	11	1	4	9	3	Trace	9	Trace	*	Trace	Trace	*	*	*	*
543 (2547)	Gold from vein outcrop −60 mesh	890.8	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	Average	884															
	Lipsey Vein																
232 (1813)	Gold mortared from quartz	899.1±0.5	12	2	Trace	7	2	3	4	*	*	4	*	*	*	*	*
231 (1831)	Gold mortared from quartz	889±2.4	7	3	5	4	9	*	3	*	*	*	*	*	*	*	9
253 (2720)	Gold in quartz +60 mesh	899.7	11	1	1	14	3	Trace	5	Trace	*	3	10	*	*	*	*
253 (2720)	Gold in quartz −60 mesh	898.4	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
255 (2722)	Gold in quartz	901.9	3	1	Trace	5	2	Trace	3	Trace	*	6	10	*	*	*	*
260 (2725)	Gold in quartz	899.5	7	3	Trace	8	Trace	1	4	Trace	*	13	Trace	*	*	*	*
522 (2529)	Gold in quartz near leached pyrite +40 mesh	881.4	8	3	Trace	8	Trace	3	Trace	Trace	*	9	Trace	*	*	*	*
522 (2529)	Gold in quartz near leached pyrite −40 mesh	882.3	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
233 (1832)	Gold around leached pyrite cavities	886±3	9	5	5	8	10	*	2	*	*	19	*	*	*	*	*
235 (1815)	Gold around leached pyrite cavities	898.2	10	2	Trace	2	3	......	2	......	......	......	......	3	......	......	......
	Average	895															

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[1] The analyses were made by using a spectrograph. Each sample of gold was treated for five minutes with hot 1:2 hydrochloric acid, decanted, washed, and then treated with hot 1:2 nitric acid for five minutes. Each sample weighed 10 milligrams and 50 per cent of the light emitted was used to produce a spectrogram. The values in the body of the table are the photographic densities of spectral lines, measured on a densitometer and then reduced to arbitrary units; therefore, each value is a measure of the concentration of the particular metal, in arbitrary concentration units. It is incorrect to compare the values listed for one metal with those of another metal. When a metal is present in a concentration less than "1" on the arbitrary concentration scale, this fact is denoted by "Trace." Where a metal was not detected, this fact is denoted by an asterisk (*).

APPENDIX C—*Continued*

FINENESS AND SPECTROCHEMICAL ANALYSES[1] OF LODE GOLDS FROM JIM AND MIDAS VEINS—*Continued*

Sample No.	Description	Fineness	Wave Length														
			2,435.1	2,536.5	3,047.6	2,795.5	2,833.1	3,082.1	2,961.2	2,576.1	3,414.7	3,361.2	4,274.2	3,067.7	2,877.9	3,453.5	3,345.0
			Si	Hg	Fe	Mg	Pb	Al	Cu	Mn	Ni	Ti	Cr	Bi	Sb	Co	Zn
	Saddle Vein																
544 (2548)	Gold in quartz with pyrite and sphalerite +40 mesh	881.3	9	7	Trace	9	30	Trace	3	Trace	*	*	Trace	*	*	*	*
544 (2548)	Gold in quartz with pyrite and sphalerite −40 mesh	874.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
545 (2549)	Gold in quartz with pyrite, galena, and sphalerite, +60 mesh	879.6	6	10	Trace	8	7	Trace	3	Trace	*	*	9	*	*	*	*
	Average	878	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Station 4 Vein																
252 (2719)	Gold picked from leached pyrite cavities	886.01	7	1	2	10	*	Trace	2	Trace	*	*	Trace	*	*	*	*
256 (2723)	Gold in honeycomb quartz	889.42	5	2	3	18	*	Trace	Trace	Trace	*	Trace	Trace	*	*	*	*
	Average	888	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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[1] The analyses were made by using a spectrograph. Each sample of gold was treated for five minutes with hot 1:2 hydrochloric acid, decanted, washed, and then treated with hot 1:2 nitric acid for five minutes. Each sample weighed 10 milligrams and 50 per cent of the light emitted was used to produce a spectrogram. The values in the body of the table are the photographic densities of spectral lines, measured on a densitometer and then reduced to arbitrary units; therefore, each value is a measure of the concentration of the particular metal, in arbitrary concentration units. It is incorrect to compare the values listed for one metal with those of another metal. When a metal is present in a concentration less than "1" on the arbitrary concentration scale, this fact is denoted by "Trace." Where a metal was not detected, this fact is denoted by an asterisk (*).

APPENDIX C—*Continued*

FINENESS AND SPECTROCHEMICAL ANALYSES[1] OF LODE GOLDS FROM SNOWSHOE AND CORBAN VEINS

Sample No.	Description	Fineness	Wave Length														
			2,435.1	2,536.5	3,047.6	2,795.5	2,833.1	3,082.1	2,961.2	2,576.1	3,414.7	3,361.2	4,274.2	3,067.7	2,877.9	3,453.5	3,345.0
			Si	Hg	Fe	Mg	Pb	Al	Cu	Mn	Ni	Ti	Cr	Bi	Sb	Co	Zn
	Snowshoe Veins																
	Vein at upper Arrastre adit—																
228 (1811)	Gold in unmineralized quartz on dump	915.6 ± 0.5	14	2	Trace	10	2	2	4	*	*	*	*	*	*	*	*
229 (1812)	Oxidized pyrite with visible gold	879 ± 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
249 (2716)	Gold from leached pyrite cavity	910.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
251 (2718)	Gold panned from vein in adit	919.8	2	4	Trace	7	3	Trace	4	Trace	*	*	Trace	*	*	*	*
	Average	906	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Vein by road leading to camp—																
227 (1810)	Gold in pannings from vein in open cut	909.2	8	3	Trace	4	*	*	2	*	*	*	*	17	*	*	*
250 (2717)	Gold in pannings from vein in open cut +40 mesh	898.0	9	3	8	8	7	Trace	4	Trace	*	*	Trace	*	*	*	*
250 (2717)	Gold in pannings from vein in open cut −40 mesh	885.3	19	5	18	11	58	3	5	Trace	*	Trace	9	*	*	*	7
254 (2721)	Gold in pan concentrates from caved drift +40 mesh	911.9	1	4	3	8	*	Trace	3	Trace	*	27	Trace	*	*	*	*
254 (2721)	Gold in pan concentrates from caved drift −40 mesh	908.4	4	3	33	16	21	Trace	3	15	4	58	14	*	*	*	Trace
542 (2546)	Gold in pan concentrates from leached quartz +60 mesh	893.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
542 (2546)	Gold in pan concentrates from leached quartz −60 mesh	891.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Average	900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
529 (2533)	Vein in Camp Level at station 1 + 35 feet—quartz with coarsely crystalline pyrite	902.3[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
530 (2534)	Vein in Camp Level at station 1 + 30 feet—quartz with coarsely crystalline pyrite	903.0[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
531 (2535)	Vein in Camp Level at station 1 + 20 feet—quartz with 50 per cent pyrite	922.2[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

---

[1] The analyses were made by using a spectrograph. Each sample of gold was treated for five minutes with hot 1:2 hydrochloric acid, decanted, washed, and then treated with hot 1:2 nitric acid for five minutes. Each sample weighed 10 milligrams and 50 per cent of the light emitted was used to produce a spectrogram. The values in the body of the table are the photographic densities of spectral lines, measured on a densitometer and then reduced to arbitrary units; therefore, each value is a measure of the concentration of the particular metal, in arbitrary concentration units. It is incorrect to compare the values listed for one metal with those of another metal. When a metal is present in a concentration less than "1" on the arbitrary concentration scale, this fact is denoted by "Trace." Where a metal was not detected, this fact is denoted by an asterisk (*).

[2] Fineness of gold bead obtained by smelting pyrite.

APPENDIX C—*Continued*

FINENESS AND SPECTROCHEMICAL ANALYSES[1] OF LODE GOLDS FROM SNOWSHOE AND CORBAN VEINS—*Continued*

Sample No.	Description	Fineness	Wave Length														
			2,435.1	2,536.5	3,047.6	2,795.5	2,833.1	3,082.1	2,961.2	2,576.1	3,414.7	3,361.2	4,274.2	3,067.7	2,877.9	3,453.5	3,345.0
			Si	Hg	Fe	Mg	Pb	Al	Cu	Mn	Ni	Ti	Cr	Bi	Sb	Co	Zn
	Snowshoe Veins—Continued																
521 (2528)	Vein in Intermediate Level at station 4+30 feet—fine grained pyrite in quartz	915.1[2]	—	—	—	—	—	—	—	—	—		—	—	—	—	—
534 (2538)	Vein in Intermediate Level at station 6+08 feet—high-grade stringer of solid pyrite	933.0[2]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Average	915	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Corban Vein																
217 (1821)	Gold in quartz from dump		5	5	5	10	2	*	1	*	*	11	*	*	*	*	10
218 (1822)	Gold in quartz from dump	841±3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
219 (1809)	Visible gold in pyrite from dump	887±7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Average	864	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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[1] The analyses were made by using a spectrograph. Each sample of gold was treated for five minutes with hot 1:2 hydrochloric acid, decanted, washed, and then treated with hot 1:2 nitric acid for five minutes. Each sample weighed 10 milligrams and 50 per cent of the light emitted was used to produce a spectrogram. The values in the body of the table are the photographic densities of spectral lines, measured on a densitometer and then reduced to arbitrary units; therefore, each value is a measure of the concentration of the particular metal, in arbitrary concentration units. It is incorrect to compare the values listed for one metal with those of another metal. When a metal is present in a concentration less than "1" on the arbitrary concentration scale, this fact is denoted by "Trace." Where a metal was not detected, this fact is denoted by an asterisk (*).

[2] Fineness of gold bead obtained by smelting pyrite.

APPENDIX D

FINENESS AND SPECTROCHEMICAL ANALYSES[1] OF PLACER GOLDS

Sample No.	Description	Fineness	Wave Length														
			2,435.1	2,536.5	3,047.6	2,795.5	2,833.1	3,082.1	2,961.2	2,576.1	3,414.7	3,361.2	4,274.2	3,067.7	2,877.9	3,453.5	3,345.0
			Si	Hg	Fe	Mg	Pb	Al	Cu	Mn	Ni	Ti	Cr	Bi	Sb	Co	Zn
247 (2714)	Little Snowshoe Creek—placer gold from 1 mile above junction of Snowshoe Creek	880.0	7	2	24	23	Trace	2	Trace	3	*	Trace	7	*	*	*	*
248 (2715)	Luce Creek—gold from head of Minisci Pit	817.6	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	French Snowshoe Creek—																
223 (1826)	From creek at J. Sockett's camp	857.7	3	4	2	3	1	*	3	*	*	*	4	*	*	*	*
224 (1827)	From ground-sluice at J. Sockett's camp 100 feet above creek level	......	1	5	3	4	13	2	2	*	*	*	20	*	*	*	*
225 (1828)	Three-quarter mile upstream from J. Sockett's camp	820±0.4	6	5	6	7	4	3	1	*	7	*	6	3	3	*	*
226 (1829)	1¼ miles downstream from J. Sockett's camp	824.4	5	3	3	6	2	3	*	*	*	*	5	*	*	*	*
	Average	834	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	Keithley Creek—																
240 (1836)	Placer nugget from mouth of Weaver Creek	904.6±0.5	4	1	1	5	2	*	2	*	*	*	4	*	*	*	*
241 (1837)	Placer nugget from mouth of Weaver Creek	941.2±0.1	3	4	2	3	2	*	4	*	*	*	*	*	*	*	*
	Average placer gold from mouth of Weaver Creek from Mint returns	911	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	Average placer gold from mouth of Four Mile Creek from Mint returns	913	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	Average	913	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	Barr Creek—fineness of placer gold from Mint returns	918	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	Cunningham Creek—fineness of placer gold from Mint returns	861.5	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
	Harvey Creek—fineness of placer gold from Mint returns	901	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......

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[1] The analyses were made by using a spectrograph. Each sample of gold was treated for five minutes with hot 1:2 hydrochloric acid, decanted, washed, and then treated with hot 1:2 nitric acid for five minutes. Each sample weighed 10 milligrams and 50 per cent of the light emitted was used to produce a spectrogram. The values in the body of the table are the photographic densities of spectral lines, measured on a densitometer and then reduced to arbitrary units; therefore, each value is a measure of the concentration of the particular metal, in arbitrary concentration units. It is incorrect to compare the values listed for one metal with those of another metal. When a metal is present in a concentration less than "1" on the arbitrary concentration scale, this fact is denoted by "Trace." Where a metal was not detected, this fact is denoted by an asterisk (*).

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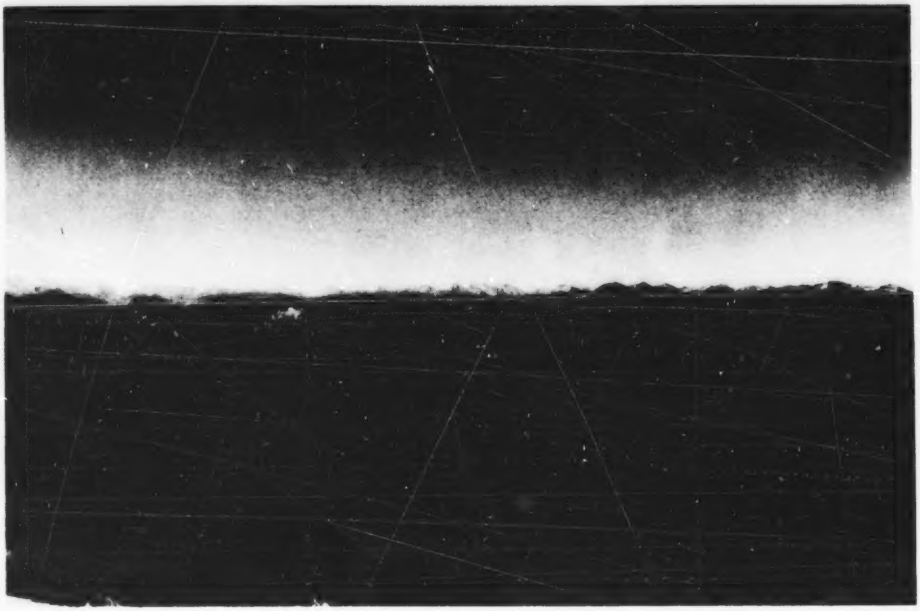
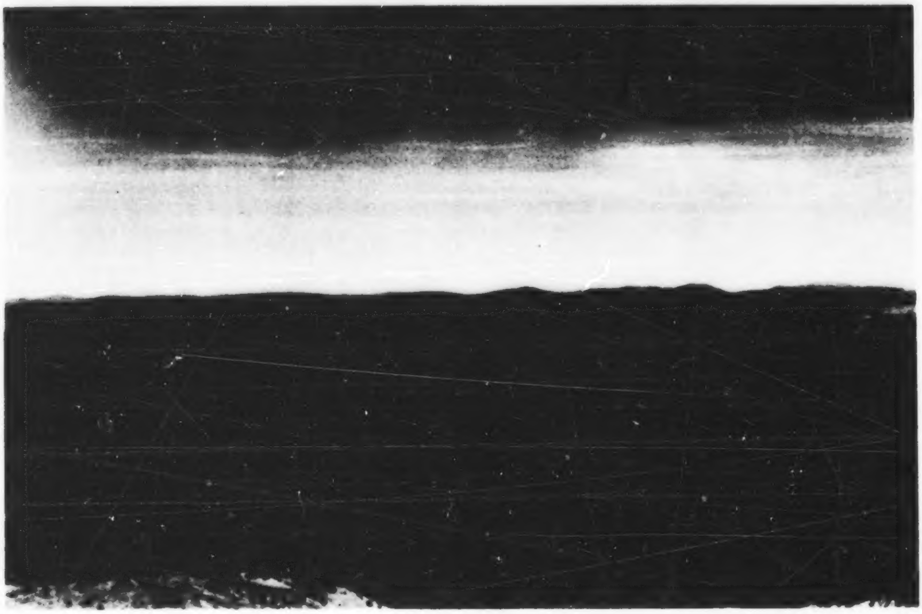
PLATE I

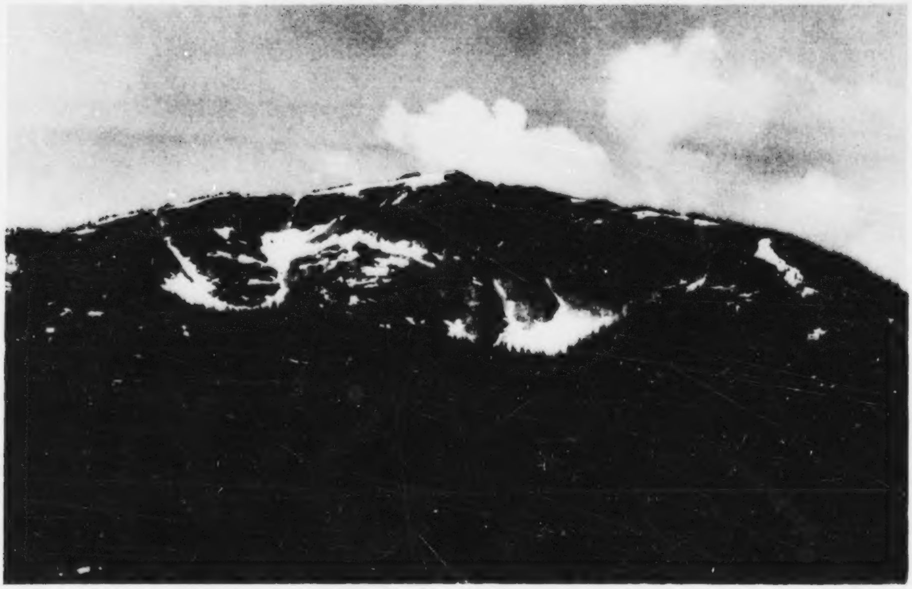


(A) View eastward from Harvey A down Harvey Creek and up Little River to the high Cariboo Mountains in the distance (photo by Topographic Division of Department of Lands and Forests).



(B) View northwestward from Yanks Peak across Little Snowshoe Creek and the head of the Swift River to the sky-line of monotonously timbered summits of the Interior Plateau (photo by Topographic Division of Department of Lands and Forests).

PLATE II



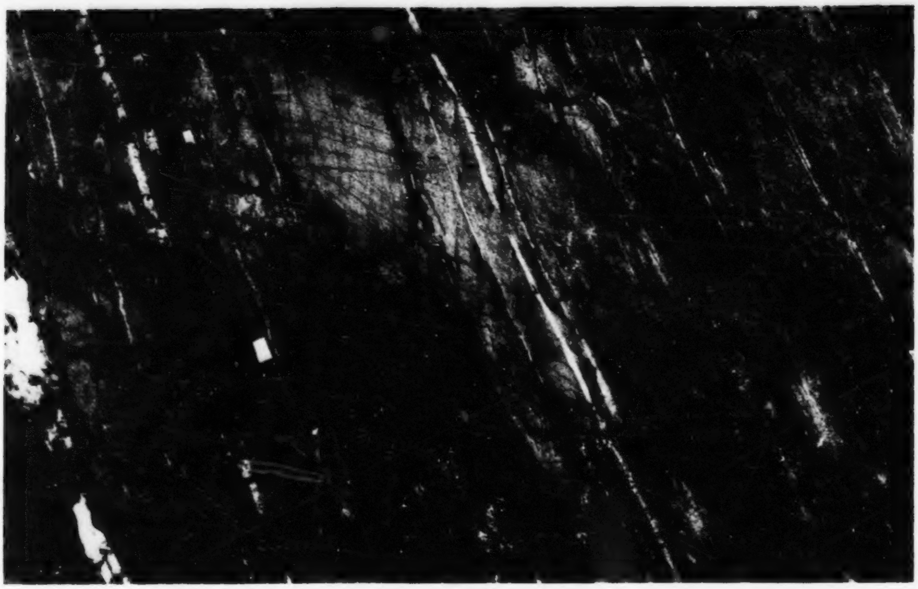
(A) Yanks Peak as seen from the camp of Snowshoe Gold Mines Limited. Four steeply, right-dipping gullies, the two at the left filled with snow and the two beneath the peak in shadow, mark the traces of faults. The Jews Hollow fault is the one at extreme left.

(B) Camp buildings and mine dumps of Snowshoe Gold Mines Limited at the head of Luce Creek as seen from Yanks Peak.

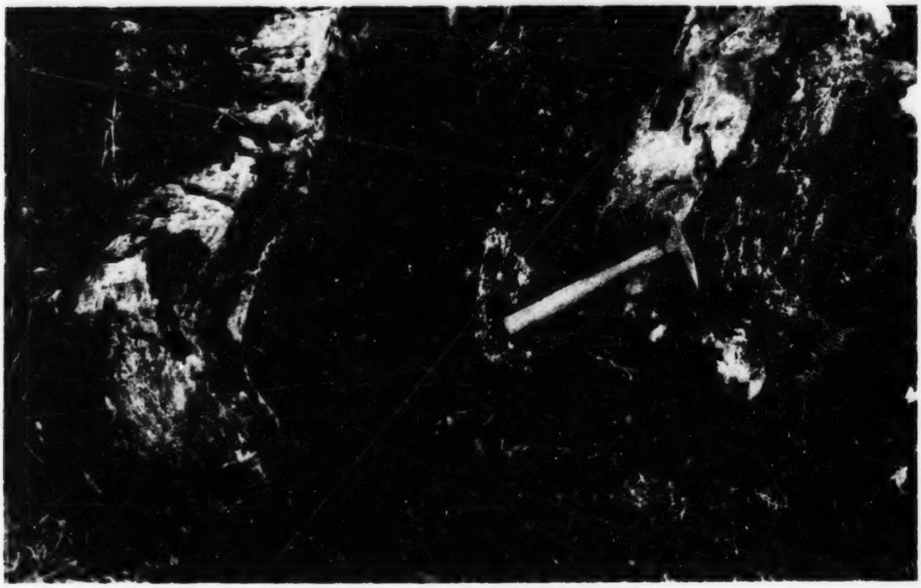
PLATE III

(A) Looking northeast from Yanks Peak across the Snowshoe Plateau and the head of French Snowshoe Creek to Base Mountain and Roundtop Mountain in left distance. The Cariboo Mountains are on the distant sky-line (photo by Topographic Division of Department of Lands and Forests).

(B) Looking southwest from Roundtop Mountain up the valley of the head of Cunningham Creek and across the Snowshoe Plateau to Yanks Peak in the left distance and Cariboo Mountain in the right distance.



(A) Cross-bedding on a vertical face in Midas silty quartzite. The gentle right-dipping beds are truncated by almost horizontal cross-beds. The steep right-dipping axial plane cleavage (parallel to the pencil) indicates that the crest of an anticline lies to the left.



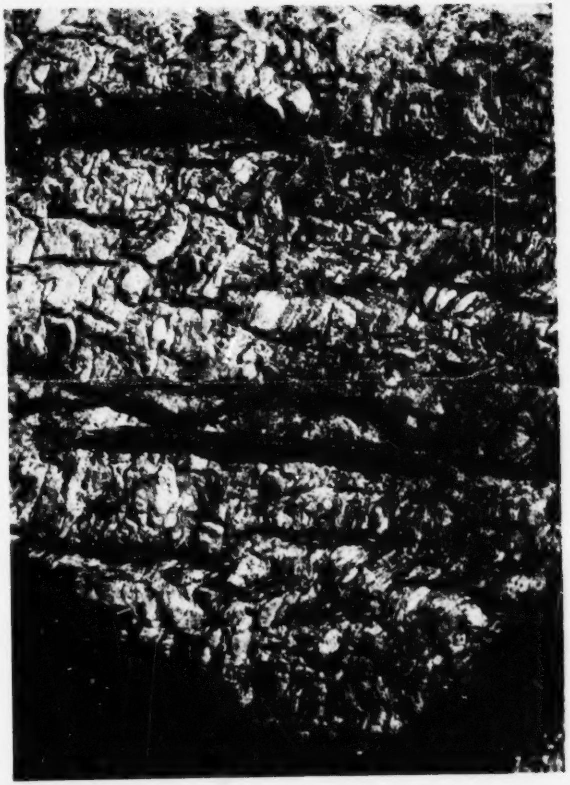
(B) The keel of an overturned syncline in Snowshoe formation at the head of Little Snowshoe Creek. The hammer-handle is in the axial plane of the fold, and the plunge of the fold is about 20 degrees into the picture.

PLATE V

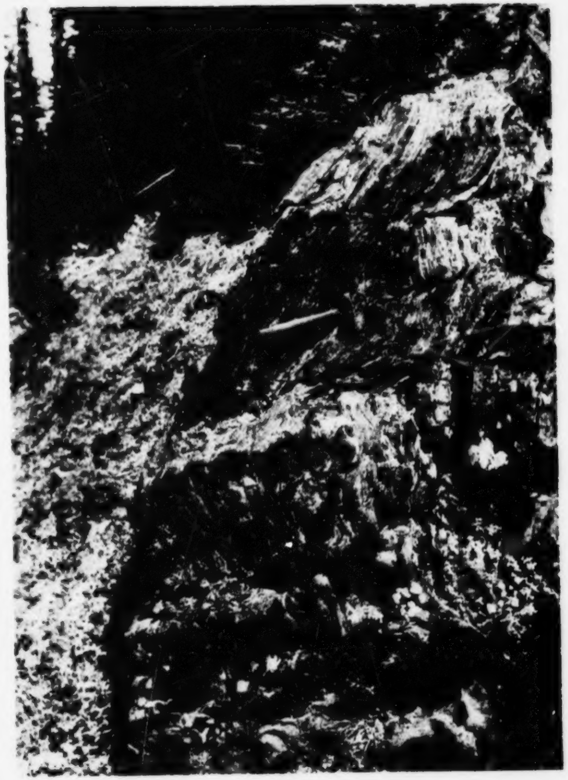
(A) Cleavage-bedding relationships in Midas formation on the ridge northeast of Middle. The steep left-dipping axial plane cleavage crossed by more moderate right-dipping bedding indicates that the axis of a syncline lies to the right.

(B) Dragfolded limestone of upper Snowshoe member in the canyon on Cunningham Creek about 1,000 feet upstream from the junction of Peter Gulch.

PLATE VI

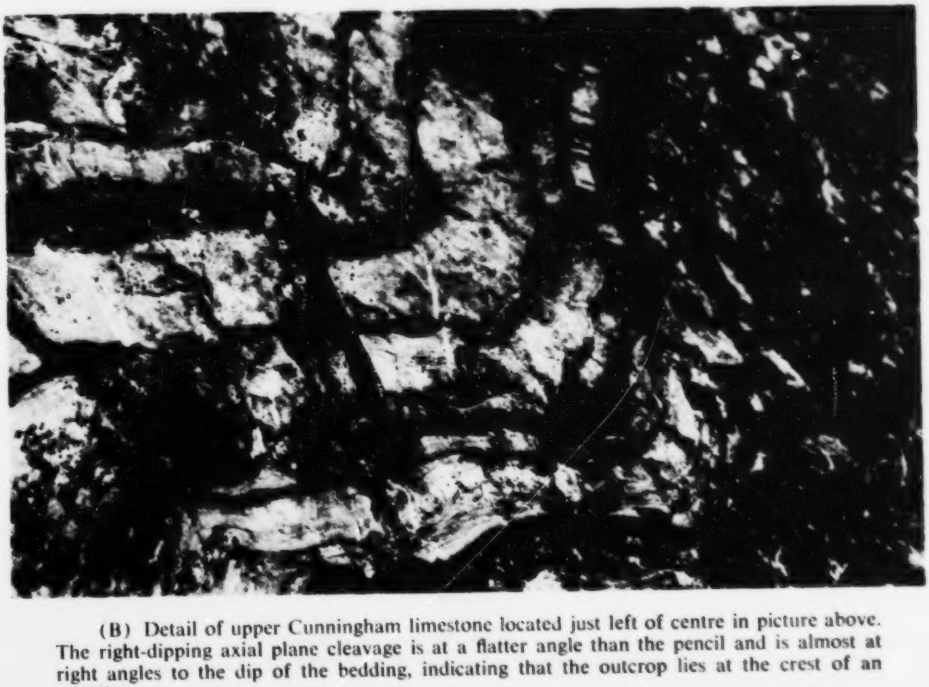


(A) Basal Snowshoe conglomerate on the ridge north of Luce Creek. The pebbles are squeezed and their long dimensions lie in a steep left-dipping plane. The pencil lies in a plane of almost horizontal fracture cleavage.



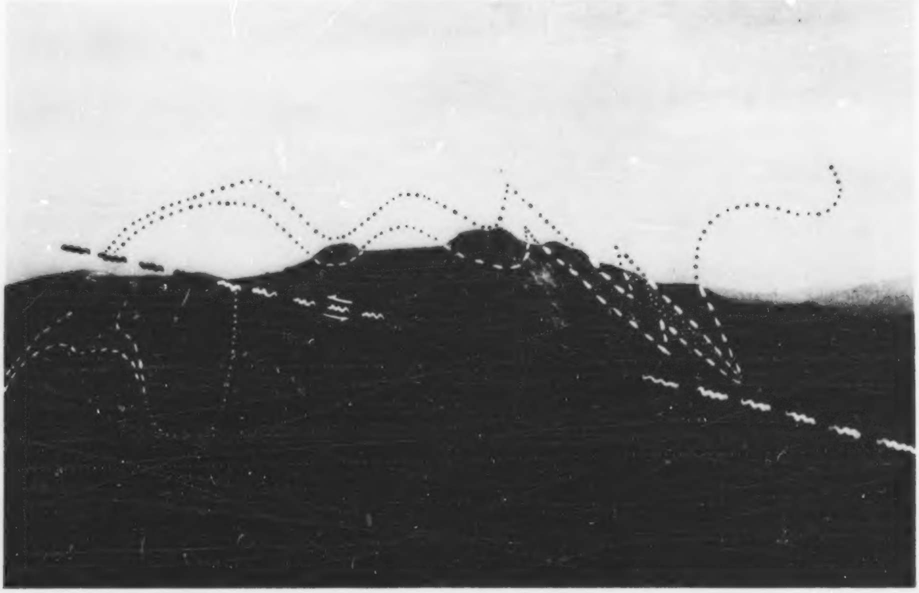
(B) An outcrop of upper Midas silty quartzite on Horseshoe Nail Gulch showing steep left-dipping axial plane cleavage crossed by gentle left-dipping fracture cleavage. Small movements along the planes of fracture cleavage have deformed the foliation planes into slight " S " shapes.

(A) Outcrop of Cunningham limestone on the north side of Sixbee Creek. The left-dipping (southwesterly) beds are close to the crest of an anticlinal fold and are overlain uphill by Yankee Belle formation.



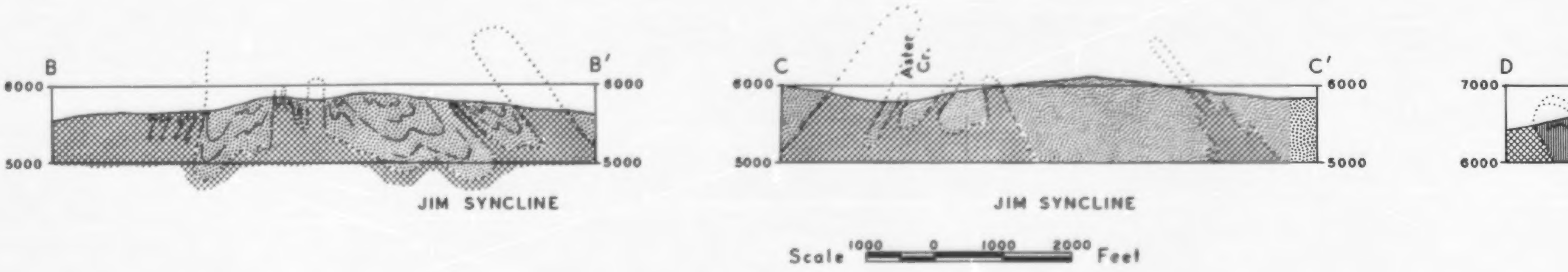
(B) Detail of upper Cunningham limestone located just left of centre in picture above. The right-dipping axial plane cleavage is at a flatter angle than the pencil and is almost at right angles to the dip of the bedding, indicating that the outcrop lies at the crest of an anticline.

PLATE VIII



(A) Roundtop Mountain viewed from Middle. The outcrop areas of Yanks Peak quartzite are stippled in white and the fold interpretation is shown. The Roundtop fault cuts across the southeast side of the mountain and shows as a clearly marked lineament. The Lostway fault is in the valley at the bottom of the picture.

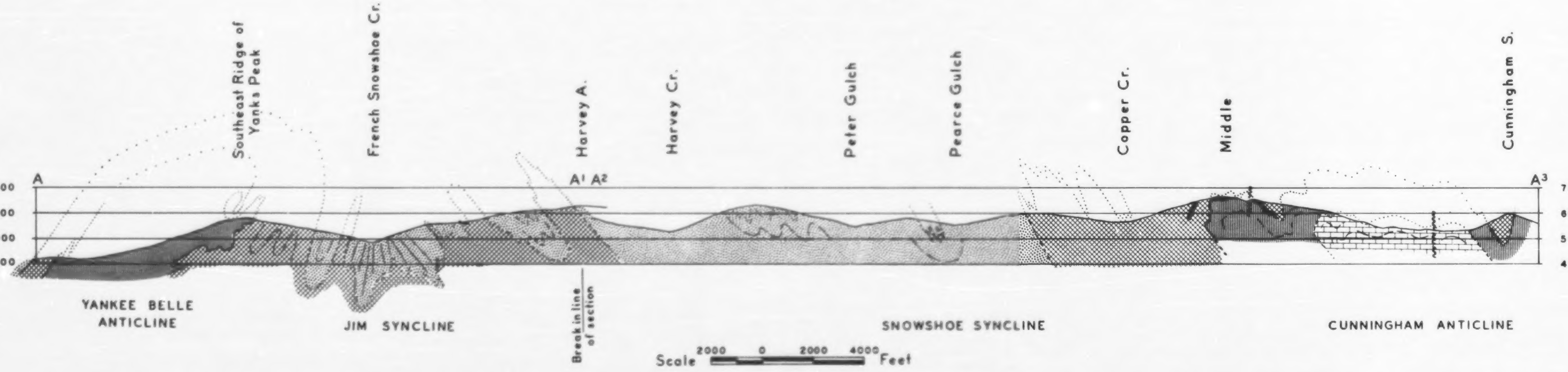
(B) Overturned syncline in Yanks Peak quartzite on the ridge northeast of Middle. The keel of the fold is in the centre of the picture between overturned steep left-dipping beds on the left and moderate left-dipping beds on the right.


B
B'
6000
5000
JIM SYNCLINE
C
C'
Aster Cr.
6000
5000
JIM SYNCLINE
D
D'
Roundtop Mtn.
7000
6000
CUNNINGHAM ANTICLINE
Scale 1000 0 1000 2000 Feet

Geological cross-sections along lines B-B' C-C' and D-D'

▮ Diabase dyke ▨ Upper Snowshoe member ▨ Snowshoe formation ▨ Midas formation

∿ Yanks Peak quartzite ▨ Yankee Belle formation ▦ Cunningham limestone


Southeast Ridge of Yanks Peak
French Snowshoe Cr.
Harvey A.
Harvey Cr.
Peter Gulch
Pearce Gulch
Copper Cr.
Middle
Cunningham S.
A
A¹ A²
A³
7000
6000
5000
4000
YANKEE BELLE ANTICLINE
JIM SYNCLINE
Break in line of section
SNOWSHOE SYNCLINE
CUNNINGHAM ANTICLINE
Scale 2000 0 2000 4000 Feet

Geological cross-section between Yanks Peak and Cunningham S.
Figure 3

To accompany B.C. Department of Mines Bulletin 34
by S.S. Holland, 1953

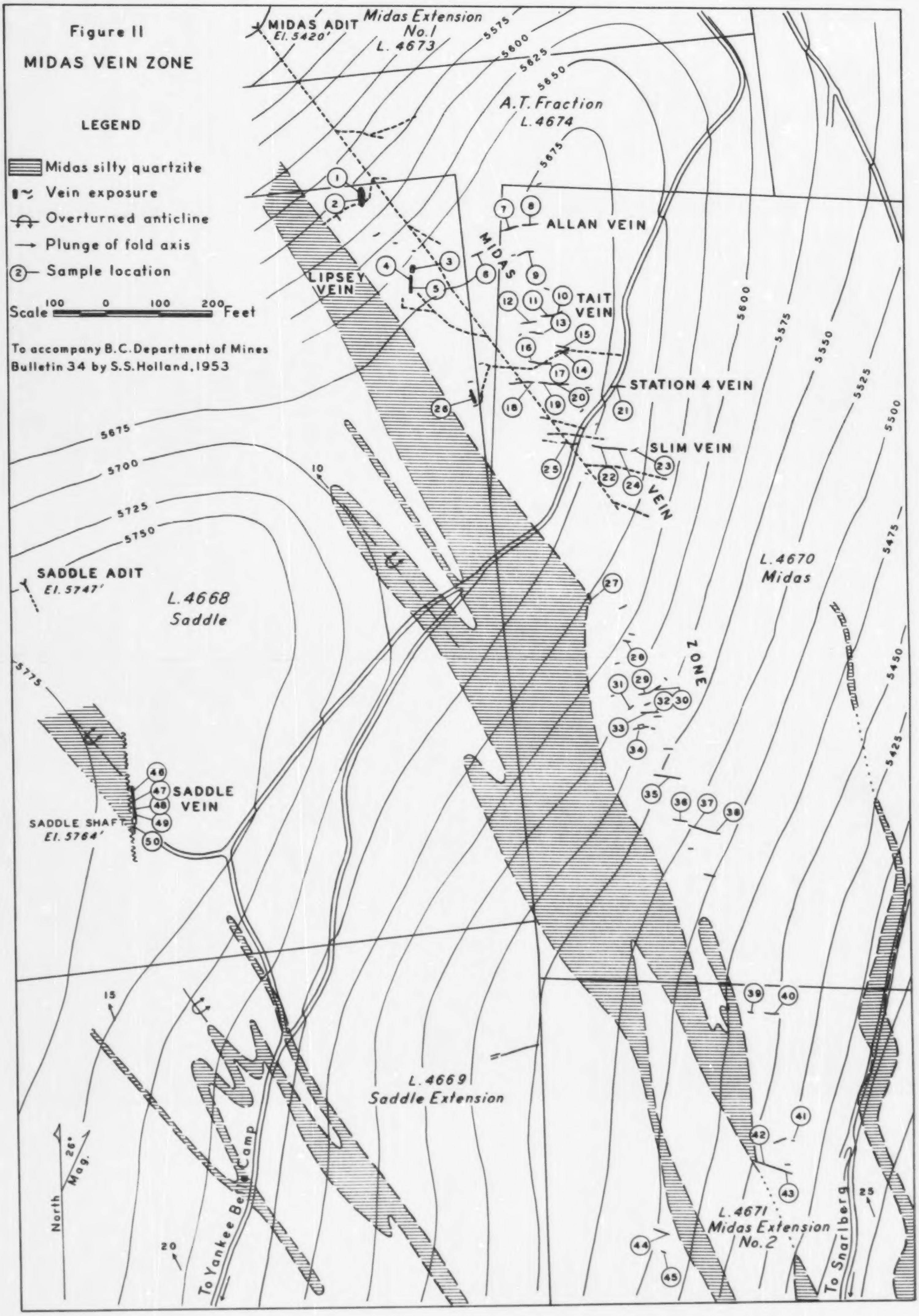


Figure II

MIDAS VEIN ZONE

LEGEND
▤ Midas silty quartzite
Vein exposure
Overturned anticline
→ Plunge of fold axis
② Sample location
Scale 100 0 100 200 Feet
MIDAS ADIT El. 5420'
Midas Extension No. 1 L. 4673
A.T. Fraction L. 4674
ALLAN VEIN
MIDAS
TAIT VEIN
LIPSEY VEIN
STATION 4 VEIN
SLIM VEIN
VEIN
ZONE
L. 4670 Midas
L. 4668 Saddle
SADDLE ADIT El. 5747'
SADDLE VEIN
SADDLE SHAFT El. 5764'
L. 4669 Saddle Extension
L. 4671 Midas Extension No. 2
To Yankee Belle Camp
To Snarlberg
North Mag. 26°
5575
5600
5625
5650
5675
5700
5725
5750
5775
5550
5525
5500
5475
5450
5425
10
15
20
25

To accompany B.C. Department of Mines Bulletin 34 by S.S. Holland, 1953

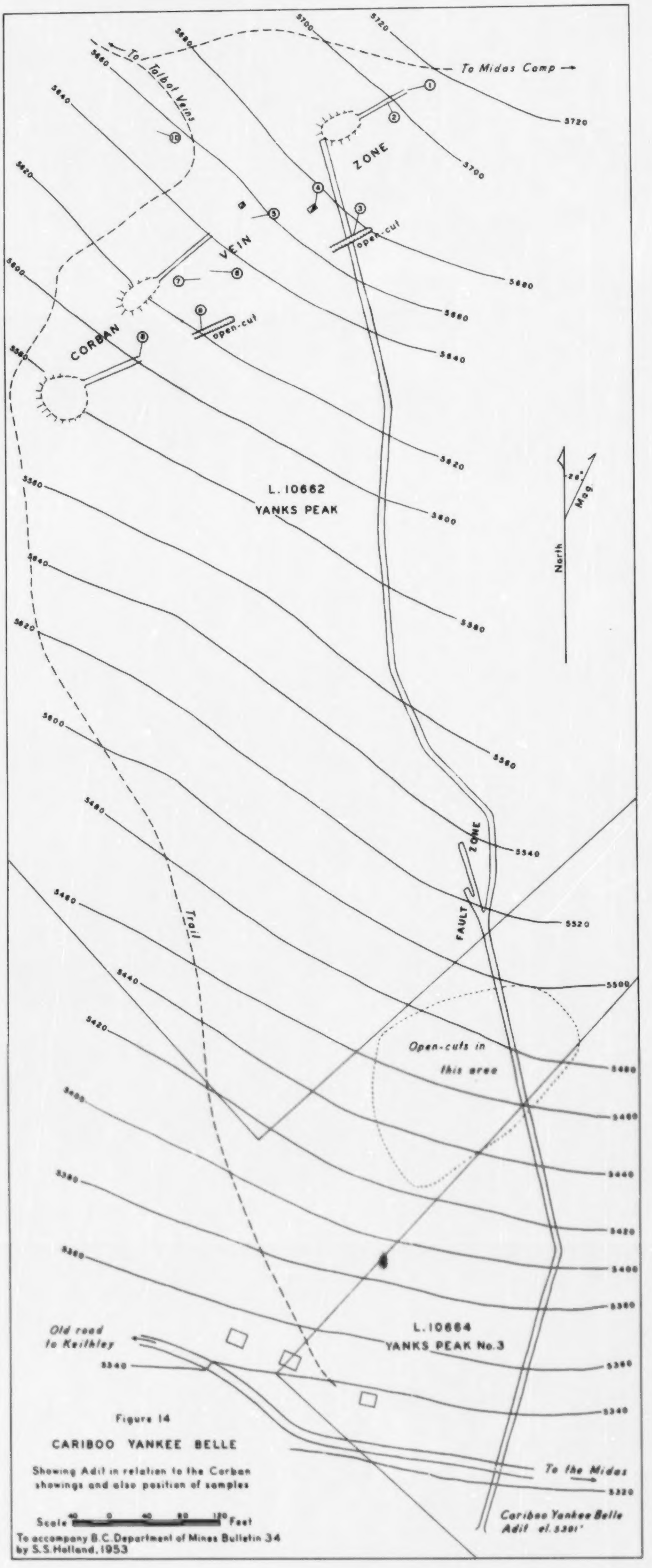

To Midas Camp →
To Talbot Veins
ZONE
VEIN
CORBAN
open-cut
open-cut
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
L. 10662
YANKS PEAK
North
Mag.
20°
FAULT
ZONE
Trail
Open-cuts in
this area
L. 10664
YANKS PEAK No. 3
Old road
to Keithley
To the Midas
Cariboo Yankee Belle
Adit el. 5301'
5720
5700
5680
5660
5640
5620
5600
5580
5560
5540
5520
5500
5480
5460
5440
5420
5400
5380
5360
5340
5320
Scale
40
0
40
80
120
Feet

Figure 14

CARIBOO YANKEE BELLE

Showing Adit in relation to the Corban showings and also position of samples

To accompany B.C. Department of Mines Bulletin 34
by S.S. Holland, 1953